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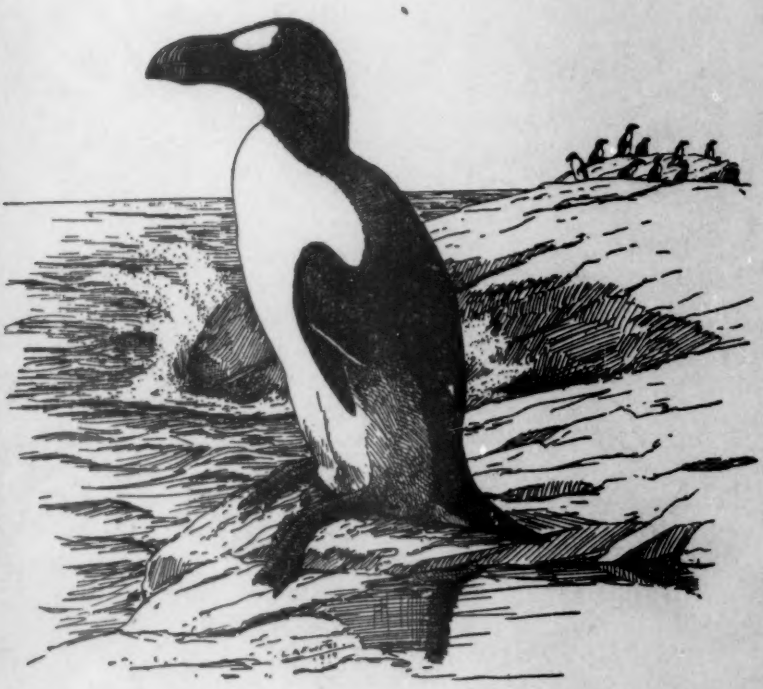

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SNOWY OWL PERCHED ON THE ROOF OF THE NEW ENGLAND MUSEUM OF NATURAL HISTORY, BOSTON, MASSACHUSETTS, DECEMBER, 1941.

Photograph by Bradford Washburn.

THE AUK

A QUARTERLY JOURNAL OF

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FOOD OF THE SNOWY OWL

BY ALFRED O. GROSS

Plate 1

THE Snowy Owl has elicited great interest during its periodic migrations to southern Canada and northern United States. The economic status of the owl is an important factor in considering legislation that may be passed by various states for its protection. Therefore it seems advisable to ascertain from field observations and examinations of a representative series of stomachs, the present-day food habits of the species.

During the recent Snowy Owl invasions of 1926–27, 1930–31, 1934–35 and 1941–42, Bowdoin College received 205 of the owls for examination of their stomach contents. Of the 205 stomachs, 78 were empty and 127 contained various items of food which are listed in a following table. The vast majority of the stomachs contained only one kind of food; the remainder had two or more items represented in their contents. I am greatly indebted to the numerous persons who contributed entire owls or owl stomachs which they collected, and also for the field observations submitted. I am especially grateful to Mr. Remington Kellogg of the U. S. Fish and Wildlife Service for the determination of the contents of 91 of the stomachs received during the 1926–27 migration.

Mr. L. L. Snyder, Assistant Director of the Royal Ontario Museum, has contributed records of the stomach contents of thirty-two Snowy Owls collected in Ontario, and Dr. Dayton Stoner has submitted data on twenty-four of the owls collected or observed in New York State. A summary of the results of the examinations of sixty stomachs of Snowy Owls obtained in Pennsylvania, reported by George M. Sutton (1927), is also included. For additional details of the food of the Snowy Owl, consult the references in the bibliography at the end of this paper.

FOOD OF SNOWY OWLS SECURED IN NEW ENGLAND

The following table shows the kinds of food and the number of occurrences of each in the series of 127 stomachs.

TABLE 1

MAMMALS	
Norway Rat, *Rattus norvegicus*	38
Meadow Mouse, *Microtus pennsylvanicus*	18
Snowshoe Rabbit, *Lepus americanus virginianus*	5
Red Squirrel, *Sciurus hudsonicus*	3
Cottontail Rabbit, *Sylvilagus transitionalis*	2
House Mouse, *Mus musculus*	2
White-footed Mouse, *Peromyscus* sp.	2
Foot of mammal, unidentified	1
Total	71
BIRDS	
Dovekie, *Alle alle*	16
Snow Bunting, *Plectrophenax nivalis*	6
Ruffed Grouse, *Bonasa umbellus*	5
Domestic Chicken, *Gallus gallus*	5
Unidentified feathers	5
Black Duck, *Anas rubripes*	5
Domestic Pigeon, *Columba livia*	4
Old Squaw, *Clangula hyemalis*	4
American Scoter, *Oidemia americana*	3
Leach's Petrel, *Oceanodroma l. leucorhoa*	3
Robin, *Turdus migratorius*	3
Ring-necked Pheasant, *Phasianus colchicus*	3
Feathers from the owl's own body	3
White-breasted Nuthatch, *Sitta carolinensis*	2
Unidentified bird flesh	2
Meadowlark, *Sturnella magna*	1
Murre, *Uria aalge*	1
Horned Grebe, *Colymbus auritus*	1
Junco, *Junco hyemalis*	1
Migrant Shrike, *Lanius ludovicianus migrans*	1
Sanderling, *Crocethia alba*	1
Unidentified duck feathers	1
Unidentified parts of duck	1
Total	77
MISCELLANEOUS	
Vegetable debris	3
Mussel, *Mytilus edulis*	1
Fish bones	1
Fir and balsam needles	1
Sand	1

One Snowy Owl, collected at Silver Lane, Connecticut, on December 5, apparently had swallowed the stomach of a bird, presumably a Ruffed Grouse. The owl's stomach contained a piece of the grouse's stomach and the following items which are characteristic of the food eaten by a grouse: 5 fruits of the skunk cabbage, *Symplocarpus foetidus;* 2 fruits of the sour gum, *Nyssa;* 1 grape seed; 3 dogwood seeds; 1 bunchberry seed; 4 *Ambrosia artemisiafolia seeds;* 2 caterpillars; 1 cricket, *Gryllus assimilis;* a piece of bone; and a considerable amount of gravel. The weight of the contents was 5 grams.

In order to make a comparison with Mr. Snyder's results, which follow, the food contents are summarized in the following table which gives the proportionate mass of each food.

TABLE 2

Mammals:		
Destructive	46.1%	
Beneficial	5.3%	
Unidentified	1.9%	53.3%
Birds:		
Protected	37.2%	
Unprotected	4.9%	
Unidentified	1.2%	43.3%
Miscellaneous:	3.4%	3.4%
Total	100.0%	100.0%

In the following table are the items of food and the number of times they occurred in 32 stomachs of Snowy Owls collected chiefly in Ontario, Canada, and examined by L. L. Snyder.

TABLE 3

MAMMALS

Rats, *Mus decumanus* and *Rattus norvegicus*	8
Meadow Mouse, *Microtus pennsylvanicus*	6
White-footed Mouse, *Peromyscus* sp.	7
Small mammals (pellets or traces of hair)	3
Star-nosed Mole, *Condylura cristata*	1
Mole Shrew, *Blarina brevicauda*	1
Muskrat, *Ondatra zibethica*	1
Vertebrae and fragments of rat or squirrel	1
Total	28

BIRDS

Bonaparte's Gull, *Larus philadelphia*	2
Herring Gull, *Larus argentatus*	1
Coot, *Fulica americana*	1
Black Duck, *Anas rubripes*	1
English Sparrow, *Passer domesticus*	1
Snow Bunting, *Plectrophenax nivalis*	1
Domestic Pigeon, *Columba livia*	1
Unidentified feathers	1
Total	9

MISCELLANEOUS

Lake Trout, *Cristivomer namaycush*	1
Noctuid moth	1
Vegetable matter, buds, and twig	1
Total	3

Mr. Snyder sums up the results of his examinations of the 34 Snowy Owl stomachs as follows.

TABLE 4

Mammals:		
Destructive (rat, *Microtus* and *Peromyscus*)	53%	
Beneficial (muskrat, mole shrew and star-nosed mole)	9%	
Unidentified	10%	72%
Birds:		
Protected	15%	
Unprotected (pigeon and English Sparrow)	4%	
Unidentified	3%	22%
Miscellaneous:		
Fish, insects and vegetable matter	6%	6%
Total	100%	100%

Compare with the summary of examinations of stomachs collected in New England, shown in Table 2.

Dr. George Sutton (1927) reported on the examination of 123 stomachs of Snowy Owls taken in Pennsylvania. Of the 123 stomachs, 63 were empty and the remaining 60 contained the items of food listed in Table 5.

The list of mammals is interesting when compared with the mammals found in the stomachs of New England Snowy Owls. First there is a total absence of rats in the Pennsylvania specimens whereas these rodents were the commonest item of food in the New England birds, appearing in the latter twice as many times as any other one item of food.

TABLE 5

BIRDS

Poultry:		
Chicken		9
Pigeon		3
Duck		3
Game birds:		
Bob-white		4
Ruffed Grouse		3
Pheasant		1
Small birds:		
Sparrows or unidentified species		8
Blue Jay		1
	Total	32

MAMMALS

Cottontail Rabbit		26
Field mice		9
Rodent remains, unidentified		9
Gray Squirrel		3
Fox Squirrel		1
Skunk		1
	Total	49

TABLE 6

Birds:		
Ducks	6	
Chickens	4	
Pheasants	2	
Herring Gull	1	
Pigeon	1	14
Mammals:		
Rabbits	4	
Mice	2	
Red Squirrel	1	
Skunk	1	
Brown or house rat	1	9
Amphibians:		
Frog	1	1
	Total	24

In New England there were only two of the 127 stomachs which contained cottontail-rabbit remains, whereas Sutton's list shows that 26 of the 60 Pennsylvania Snowy Owls had eaten this rodent. These and other differences can be correlated with the relative abundance of the types of food in the places where the owls were collected.

Dr. Dayton Stoner has submitted the data on the food of twenty-four Snowy Owls killed or observed in New York State during the 1941–42 invasion. The items of food noted are listed in Table 6.

Dr. Stoner's records reveal that the owls collected or observed in New York were very destructive to birds, especially to the ducks. In his report he writes as follows:

"Since the Snowy Owl apparently prefers territory in the vicinity of bodies or streams of water, it is not surprising that a goodly number were seen or taken in the act of pursuing or actually feeding upon wild ducks. In addition to the records contained in the table above, a considerable number of similar reports have been recorded in corroboration of that habit. In his report on three Snowy Owls shot in Greene County, between November 8 and December 12, 1941, Laughryn Stokes writes that 'They were all shot at the water's edge, all eating ducks; but what seemed strange to us was that while dead and crippled ducks were common enough, the owls preferred to catch their own and would not eat a dead one.'"

WEIGHTS OF STOMACH CONTENTS

The weighings of the contents of the stomachs of 78 Snowy Owls were made in grams. Of these 78 stomachs, 69 contained a single item of food and 9 contained two or more items. In the following table, the kind of food, the number of stomachs in which it was found and the minimum, maximum, and average weights are indicated in cases where two or more stomachs are represented.

TABLE 7

Kind of food	*Number of stomachs*	*Weight in Grams:* *Minimum*	*Maximum*	*Average*
Rat	28	6	185	86.1
Microtus	10	5	49	22.8
Dovekie	9	4	132	56.6
Chicken	3	84	158	116.6
Peromyscus	2	5	6	5.5
Petrel	2	55	60	57.5
Oidemia	2	50	131	90.5
Robin	2	12	30	21.0
Rabbit	2	107	137	122.0
Red Squirrel	1			32.0
Horned Grebe	1			154.0
Old Squaw	1			67.0
Unidentified duck	1			82.0
Pheasant	1			47.0
Murre	1			182.0
Pigeon	1			70.0
White-breasted Nuthatch	1			16.0
Vegetable debris	1			2.0

Following are the contents of nine stomachs in which two or more kinds of food were present. The identification of the food and determinations of percentages were made by Mr. Remington Kellogg; the weighings were made at Bowdoin College.

TABLE 8

Kind of food	*Percentage*	*Weight of entire contents in grams*
1 *Oidemia*	93	
1 Junco	2	
1 Rat	5	85
1 Migrant Shrike	95	
1 Rat	2	
1 Mouse	1	
1 *Microtus*	2	37
1 Rat	20	
1 Snow Bunting	40	
1 Leach's Petrel	40	85
1 Rat	30	
1 Dovekie	70	88
1 *Microtus*	15	
1 Dovekie	85	94
1 Cottontail Rabbit	75	
1 *Microtus*	25	177
1 Foot of mammal	2	
Fish bones	98	14
1 *Microtus*	5	
1 Dovekie	95	20
1 Robin	88	
Mytilus edulis	12	26

These weighings give us information on how much food may be contained in the Snowy Owl's stomach at any one time, but they are also important in the consideration of the relative amounts of food on the basis of mass percentages. The mass or weight of a particular item depends, of course, on the amount of the animal eaten and the stage of the digestion of the food. A bird or mammal has been destroyed whether it is represented by the entire animal or by a very small amount of material. Therefore, in the case of a carnivorous bird such as the Snowy Owl, the question arises as to whether the percentage of food based solely on mass or weight gives us a truly comparative basis. In the case of the rats, for example, whether the stomach contents are represented by 6 grams (the minimum) or 185

grams (the maximum), the results in the two cases are the same, as far as the economy of nature is concerned. In both cases a rat was destroyed. Take the first case in Table 8 as another example. Here *Oidemia* represents 93 per cent of the contents, the rat 5 per cent, and the Junco only 2 per cent. In a summary of food percentages in a series of stomachs, this would give *Oidemia* too great importance while the other two items would contribute too little to the total. A direct comparison of the numbers of animals found in the stomachs gives us a truer picture of the economic status of the Snowy Owl. The case of a seed- or fruit-eating bird is different.

FIELD OBSERVATIONS

In the course of obtaining data on the distribution of the Snowy Owls during the 1941–42 migration, a number of interesting field observations were obtained concerning the food habits of the owls. Dr. Josselyn Van Tyne contributed the correspondence he received from Michigan; Dr. Harrison Lewis, that which he received from the Canadian provinces; and numerous individual reports also were received.

These observations are important in presenting a more complete picture of the economic status of the Snowy Owl. The Snowy Owl is adaptable in the choice of its food. Ordinarily, rodents such as the lemming, rats, mice, and rabbits offer the most accessible supply, but when these fail or at times when unusual demands are made upon the owls by large families of growing young or by their semi-starved condition after a long migration journey, they quickly turn to other types of animal life such as birds. Presumably a lemming or a mouse is captured with a minimum of effort, whereas an active, flying bird presents a more difficult problem to be attempted under unusual conditions. To be sure, many of the birds eaten are those that have died from other causes or which are found in a weakened or crippled condition.

On the breeding grounds of the Arctic tundra, the staple diet of the Snowy Owl is rodents, but the following observations, selected from many similar ones, give evidence that even on their home grounds these owls often resort to birds to supplement their food supply.

Frank Dufresne (1922) reports that the food of the Snowy Owl during the nesting period consists mainly of moles and ground squirrels with only an occasional ptarmigan, curlew, or plover, but he continues:

"As soon as the young Ptarmigan hatched my observations of the Snowy Owl became a record of slaughter. I had no way of telling exactly how many were eaten

on account of the softness of the bones, but I do know that rodent regurgitations practically ceased at this time. Ptarmigan, both old and young, became the main stay of the seven pairs of owls and their combined families which I had under observation. I estimate carefully and with no wish to exaggerate that a single Snowy Owl will destroy three hundred game birds in a year. The average conception among hunters is that it is twice as many, and they may be right. I myself have seen one bird kill three full grown Ptarmigan within an hour."

O. J. Murie (1929) in writing of the food of nesting Snowy Owls observed by him in the region of Hooper Bay, near the mouth of the Yukon River, Alaska, writes as follows:

"The food of the Snowy Owl varied with the character of the nesting ground. Those on the marsh in the immediate vicinity of great numbers of nesting water birds fed extensively on birds, both old and young. Others nesting in drier ground farther from the concentration of waterfowl maintained throughout the season a diet consisting almost exclusively of mice. In marshy areas remains of young Emperor Geese and Cackling Geese and adult Old-squaws, Eiders and other ducks were found."

T. Pleske (1928) states that on the Eurasian tundra the food of the Snowy Owl is not only rodents such as lemmings but when the latter are scarce it feeds on ptarmigan, Willow Grouse, and guillemots.

The following notes have been gleaned from correspondence received during the recent migration of 1941–42.

BIRDS

Pheasant.—In southern Canada and the middle-western states the pheasant appears to be a frequent victim of the Snowy Owl. In correspondence received by Dr. Harrison Lewis there are numerous reports from sportsmen and especially taxidermists in Ontario and Quebec stating that pheasant remains were found in the stomachs of many owls examined by them. On November 6, 1941, Mr. Gorden C. Wilson of Oshawa, Ontario, observed a Snowy Owl killing a pheasant. Mr. Wilson killed three owls, all of which contained remains of pheasants. Dr. Josselyn Van Tyne received reports from points throughout Michigan which clearly indicated that Snowy Owls were a menace to pheasants in that state. The following are typical of many of the reports. Near the limits of Detroit, Mr. W. J. Moulton shot a Snowy Owl that was seen attacking a pheasant. Four taxidermists in Detroit reported examining the stomach contents of owls many of which contained the remains of pheasants. Mr. E. C. Belding stated that two Snowy Owls killed in Onaway, Michigan, had their stomachs filled with pheasant remains. Mr. Miller Empy of Freeland, Michigan, reported that two Snowy Owls contained remains of pheasants and that one of the birds was feeding on a pheasant at the time it

was shot. Extracts from a letter received from Mr. Richard Gottleber of Saginaw, Michigan, are of interest. He stated that the chief food of the owls consisted of pheasants which are very abundant in his section of the state. He saw several of the owls capture hen pheasants that were crouching on the ground. He observed one of the owls strike an adult male pheasant in mid-air. He stated that the pheasant rose rapidly as it took off and that when it was about ten feet above ground, the owl struck and killed it. Mr. Gottleber found in the snow the remains of many pheasants that presumably had been killed by the owls. The owls hunted by perching on convenient vantage points in an open field. As the pheasants came into the open area to feed, the owls swept along to intercept them before they reached the dense cover. When a pheasant squatted in the open field, the owl attacked and invariably captured it.

No field reports of the Snowy Owl feeding on pheasants were received from New England although the stomachs of three owls from this section contained pheasant remains.

Ruffed Grouse.—The Ruffed Grouse is more alert than the pheasant and, since it frequents woodlands and dense cover, we would not expect it to be a common victim of the Snowy Owl; nevertheless a number of reports have come to our attention. Mr. Lester Tate of Ingall's Head, Grand Manan, New Brunswick, observed a Snowy Owl pursue and kill a Ruffed Grouse and later saw it feeding on its prey. Mr. Harold Frahm writes that the food in the stomach of a Snowy Owl killed at New London on January 24, 1942, was composed entirely of remains of grouse. E. C. Belding of Onaway, Michigan, also reports that an owl examined by him had eaten grouse. Howard Bartley of Westmount, Quebec, writes that the stomachs of Snowy Owls which he examined contained grouse, and H. Bedard of Ottawa likewise reported pheasant and grouse in four stomachs of the owls.

Bob-white.—Mr. Hinds of Saybrook, Massachusetts, saw a Snowy Owl capture and eat a Bob-white.

Ducks.—In correspondence received by Dr. Van Tyne, there are several reports of the destruction of ducks by the Snowy Owls. At Saginaw, Michigan, one of the owls was seen to capture a Mallard which it carried for a distance of half a mile before the owl was finally shot. Gilbert Vanderlin of Gladstone, Michigan, reports that he saw the owls capture a large number of wounded ducks, and stomachs of owls examined by him contained the remains of ducks. George Burin of Hamtramck, Michigan, states that the owls were seen to take three tame ducks.

At Toronto, Canada, a police officer reported that a Snowy Owl, seen on the shore of Lake Ontario, had eaten four ducks in one day and that he had seen it eat two, one after the other. The owl was killed, but when the stomach was examined at the Royal Ontario Museum of Zoology, it was found to be empty except for a trace of matted hair. Mr. W. J. Clayton of Lincoln, Maine, states that a Snowy Owl received by him was reported to have taken three tame ducks before it was killed, but when the stomach was examined it was found to be empty. These last two instances emphasize the importance of field observations since stomach contents do not always reveal the entire story. It is apparent that the flesh of birds like ducks may be eaten without bones and feathers; the flesh is quickly digested and nothing else remains to reveal the facts.

On October 23, 1941, Mr. Philip T. Coolidge of Boston saw a Snowy Owl in its savage attempts to capture a wounded duck. On November 20, 1941, I saw a nearly pure white Snowy Owl, presumably a male, perched on a rocky ledge about thirty yards from the shore of Back Bay, Portland, Maine. I observed this bird for over an hour as it leisurely picked at the flesh of a Black Duck which it held in its talons. I have no way of knowing whether the owl killed the duck or not, but since no shooting is permitted on the reservation it is possible that the duck was captured and then carried to the rock to be eaten. Under ordinary conditions at that season of the year, this particular rock is frequented by the ducks, but while the owl was enjoying its meal, the ducks had completely deserted that section of the bay.

Numerous reports have come from various places along the New England coast of depredations on ducks especially of birds that had been wounded by hunters. Everton Gott of Southwest Harbor, Maine, writes that he saw a Snowy Owl seize a duck from a large flock and then sail off so quietly and so rapidly that, apparently, the other ducks were not frightened and did not realize what had happened. Mr. Gordon C. Wilson of Oshawa, Ontario, from his duck-hunting blind on October 1 and 15 and November 15 and 28, 1941, watched Snowy Owls capture ducks, and the stomach contents of seven of the owls which he killed contained their remains. Mr. Howard Bartley of Westmount, Quebec, killed a Snowy Owl as it was attempting to take up a wounded duck. Feathers from the stomach of another Snowy Owl that were sent to me proved to be those of a Red-breasted Merganser. Carl R. Ediund, Assistant Biologist, Indian Reservation, while making a survey of the Bad River Reservation marshes on No-

vember 2, 1941, saw three different Snowy Owls that were feeding on wounded ducks crippled by hunters. A Snowy Owl that had been feeding on Scaup Ducks was killed on the reservation. R. W. Tufts, Chief Federal Migratory Officer of Wolfville, Nova Scotia, writes that the stomach of one Snowy Owl examined by him contained the remains of a Black Duck.

Poultry.—W. E. Ginn, Columbia City, Indiana, reports that a Snowy Owl was shot while eating a chicken which it had carried to a cornfield. The farmer claims to have lost many chickens, presumably from depredations by the owls. H. W. Swihart, Jackson, Michigan, writes that a Snowy Owl was killed just after it had caught and killed a hen. Mr. Lester Tate of Ingall's Head, Grand Manan, early in the morning of November 5, 1941, heard a great commotion among his poultry. The hens were squawking and running about wildly. An investigation revealed that an owl had captured one of his largest hens which, he states, was larger than the owl, itself. Mr. A. Grzela, Fauquier, Ontario, captured a Snowy Owl as it was attempting to steal his domestic fowls. In addition to these field observations, a considerable number of reports have come from taxidermists stating that remains of poultry were found in stomachs of Snowy Owls received by them.

Pigeon.—A pair of Snowy Owls took a heavy toll of pigeons sheltering under the eaves of City Hall and adjacent buildings of Lowell, Massachusetts. W. J. Clayton reports that a male Snowy Owl taken in Presque Isle, Maine, on December 12, 1941, had its stomach full of the remains of pigeons. Mr. Lucien Thibaudeau, Quebec, Canada, reports domestic pigeon remains in Snowy Owl stomachs examined by him. These representative reports reveal that Snowy Owls when hard-pressed for food may even enter our towns and cities in quest of their prey.

Black Guillemot.—F. W. Osborne, St. Mary's Island, Gulf of St. Lawrence, reported that during October, 1941, Snowy Owls fed on Black Guillemots.

Dovekie.—W. J. Clayton, Lincoln, Maine, writes that a Snowy Owl taken at New Harbor, Maine, on December 25, 1941, contained the remains of a Dovekie. The stomach examinations of New England Snowy Owls, especially those taken along the coast, indicated that the owls exacted heavy toll of the Dovekies. It is quite possible that many of these birds had perished and had then been washed up on the shores by the winds and tides where they were found by the owls. At times, Dovekies are blown inland by violent storms and when

forced to land are helpless against any attacks from predaceous birds such as the Snowy Owl.

Herring Gull.—Paul Favour reports that a Snowy Owl was seen feeding on a Herring Gull at Trenton, Maine, on October 20, 1941. Dr. Harrison Lewis received a report of a Snowy Owl that was feeding on a Herring Gull at Oshawa, Ontario. In both of these cases it was not known whether the gull was captured or found either dead or in a weakened condition.

Crow.—Observers at Detroit, Michigan, stated that Snowy Owls killed and ate full-grown Crows. Others have reported the Crows 'ganging-up' to pester the Owls.

Shorebirds.—W. A. Clark of Ram Island Ledge saw several of the owls chasing and capturing small shorebirds during November, 1941. Lester Tate of Grand Manan, New Brunswick, examined numerous pellets left by the owls along the shore of the island and found that practically all of them consisted of the feathers and bones of small shorebirds. Mr. Ernest Joy, warden of the Bowdoin Scientific Station, writes that the owls fed chiefly on Purple Sandpipers during an unusual flight of the latter during the month of October, 1941. Pellets of the owls that were posted along the shore of the island consisted almost entirely of the remains of the sandpipers, but those of other owls that kept vigil on vantage points in the interior of the island were made up largely of Snow Buntings.

Song birds.—The lightkeeper at St. Paul's Island, Nova Scotia, writes that three Snowy Owls killed and ate small song birds. The owls were shot and the stomach contents were found to consist of feathers and remains of the small birds. Dr. Van Tyne received reports from Lansing and River Rouge, Michigan, of owls' stomachs which contained the remains of song birds. An owl taken at Chester, Maine, on October 20, 1941, contained the tail feathers of a Hairy Woodpecker.

MAMMALS

Rats.—Of the various items of food eaten by the Snowy Owl after its arrival in New England, the common rat is the most frequent. This is especially true of individuals which congregate about the dumps of the larger cities, but reports from field observers in localities remote from cities also reveal that rats are included in the diet of the owls.

Mr. Arthur B. Williams, Cleveland, Ohio, writes that at a refuse dump in the Cuyahoga Valley where the rats were numerous, there were, throughout the months of December and January, a dozen Snowy

Owls which roosted under a bridge and which seemed to feed exclusively on the rats. On December 12, 1941, Mrs. R. J. Seamans of Fall River, Massachusetts, saw a Snowy Owl eating a rat. Kenneth H. Doan of Put-in-Bay, Ohio, saw a Snowy Owl feeding on three different house rats during the course of a single morning. E. D. Eliot of Cape Elizabeth, Maine, observed the owls feeding on the rats in that vicinity. R. W. Tufts, Chief Migratory Bird Officer, Wolfville, Nova Scotia, writes that an owl examined by him contained two medium-sized rats. Similar reports have come from many sections of the migratory range of the owl.

Mice.—Mice, like rats, are frequently taken by the Snowy Owl, for these two rodents probably represent the best substitute for its food, the lemming, on which it largely depends while on its nesting grounds in the Arctic. In the stomachs of New England owls that have been examined, mice take a place second only to that of the common rat. Mr. Snyder found mice to be the most important element of food in owls' stomachs collected in Ontario. Mr. Lester Tate observed several Snowy Owls feeding on field mice and common house mice on Grand Manan Island, New Brunswick. R. W. Tufts reports that at Canso, Nova Scotia, a Snowy Owl was seen with a mouse hanging in its claws. The bird was unusually tame and allowed the observer to approach near enough to identify its victim. E. D. Eliot of Cape Elizabeth, and J. J. Sharon, of Pond Island, Maine, observed Snowy Owls feeding on mice in the open fields of their respective localities. Mrs. L. E. Erbe, of Applegate, Michigan, states that the chief food of the Snowy Owls that visited that section consisted of mice and moles. Messrs. Frank Generou, McMillan, Michigan; J. B. Nunemaker, River Rouge, Michigan; S. W. Swihart, Jackson, Michigan; Howard Bartley and Adelard Bartley, Westmount, Quebec; A. Ranger, Hawkesbury, Ontario; W. E. Wilbee, Toronto; H. Beddard, Ottawa; and W. J. Clayton, Lincoln, Maine, all report finding mice in the stomachs of Snowy Owls.

Star-nosed Mole.—Mr. Amedee Lord, Quebec Bridge, Province of Quebec, reports that he found a star-nosed mole in the stomach of a Snowy Owl killed at St. Fay, Quebec, on November 27, 1941. Mr. Snyder found the remains of a star-nosed mole in the stomach of one of the owls collected at Weller's Bay, Ontario, on December 20, 1941. Moles, no doubt, are a very acceptable article of food for the Snowy Owl and are probably taken more often than the few reports would seem to indicate.

Rabbits and Hares.—Only seven of the 127 New England Snowy

Owls examined had eaten hares or rabbits, but it is apparent that these animals constitute a very important item of food in certain localities. This is shown by owls collected in Pennsylvania and examined by Sutton of which 26 out of 60 had eaten cottontails.

Mr. Paul Favour reports that a Snowy Owl was shot on Great Cranberry Island on October 25, 1941, while it was chasing a hare, and on November 20 a Snowy Owl was seen feeding on a hare at the Bar Harbor airport. Mr. Lester Tate observed a Snowy Owl on Grand Manan Island, New Brunswick, that was feeding on a rabbit. James R. Moore, Old Saybrook, Connecticut, saw a Snowy Owl feeding on a freshly killed cottontail on a ledge near the shore of Long Island Sound, January 12, 1942. On October 24, 1941, Mr. Robert W. Sauer killed a Snowy Owl at eleven o'clock at night while it was feeding on a snowshoe hare. Joseph A. Hagar, Massachusetts State Ornithologist, states that four Snowy Owls were killed on Penikese Island, Massachusetts, in order to protect the cottontails propagated there. No report was made on the stomach contents of the owls killed.

The following persons, many of them taxidermists, reported remains of rabbits or hares in the stomachs of the owls examined by them. M. O. Hunsko and Frank Generou, MacMillan; Stephen Koscielski, Bay City; H. W. Swihart, Jackson; Harold Frahm, Detroit; and taxidermists of Port Huron, Michigan; William Holiday Gueph and Adelaird Ranger, Hawkesbury, Ontario; T. Emack, Toronto; and H. Bedard, Ottawa. It will be noted that the majority of the reports came from Michigan and Canadian provinces where it is evident that rabbits and hares constitute an important element of the food of the owls.

Squirrels.—Three of the 127 New England owls examined contained remains of red squirrels. H. Bedard and Howard Bartley, Westmount, Quebec, reported squirrels in the stomachs of Snowy Owls examined by them. Adelaird Ranger of Hawkesbury, Ontario, writes that the stomach of one of the owls contained the remains of a flying squirrel. J. B. Nunemaker, River Rouge, Michigan, found a ground squirrel in the stomach of one of the owls.

Muskrat.—George Mariage, Rapid City, Michigan, states that a Snowy Owl ate a muskrat which had been caught in a trap. Dr. Van Tyne received a report that the remains of a muskrat were found in the stomach of one of the owls at Saginaw, Michigan. W. J. Moulton, Detroit, Michigan, caught a Snowy Owl in a trap set for a muskrat. The owl would not have been interested in the bait that was used

and whether it was attempting to capture a muskrat near the trap at the time it was caught can never be known.

Sheep.—The Parkhouse Taxidermy Company, Lansing, Michigan, found wool in the stomachs of some of the owls received by them. These owls probably fed on sheep that had died or been killed.

Dogs.—W. J. Moulton, Detroit, Michigan, writes that a farmer killed a Snowy Owl with a chain while it was viciously attacking a dog. Another correspondent reported that his beagle was attacked by one of the owls when the dog was only ten feet away from him.

Man.—A Snowy Owl swooped down on Robert White while he was duck hunting. When it was seized and captured alive, it made a second attempt to snatch his hat. Whether the man or his hat was the owl's objective we do not know, but it was probably the hat.

MISCELLANEOUS

Mr. W. J. Clayton reports that a male Snowy Owl taken at Chester, Maine, on November 20, 1941, had its stomach filled with ground beetles. Dr. Harrison Lewis received a report of an owl taken at Aylmer, Ontario, on April 15, 1942, which had a leopard frog in its stomach.

Mr. Ernest Joy, warden at the Bowdoin Scientific Station, Kent Island, Bay of Fundy, observed a Snowy Owl actively feeding on barnacles that covered the rocks exposed at low tide. The owl busied itself at this task for some time, indicating that it was hungry and that this unusual food was satisfying. Mr. Joy also reports that he noticed several of the owls turning over the kelp at low tide; apparently they were feeding on the small crustaceans which abound in such places.

Mr. W. J. Clayton found the stomach of one of the owls filled with lichens. This owl was taken at Carroll, Maine, and was seen on the lichen-covered rocks and stumps for two days before it was killed. It evidently had collected these lichens in the absence of more desirable food. Mr. Clayton also examined a Snowy Owl killed at Chester, Maine, on October 20, 1941, and found the stomach full of the terminal buds of the white maple. This probably represents another case in which the owl had swallowed the stomach of a grouse or bird of similar food habits. (For other field observations see Gross 1927 and 1931.)

In summing up the results of the stomach examinations and field observations of food habits, the evidence is about equally for and against the Snowy Owl so far as the economic interests of man are concerned. The species is beneficial by reason of its destruction of

mice and, especially, that most despised of all rodents, the Norway rat, but it is also very destructive to game and song birds, poultry, and certain useful mammals. The total number of birds and useful mammals that are eaten is just about equal to the number of destructive mammals, and hence little can be claimed in favor of the Snowy Owl on the basis of its food habits. However, most of us will agree that this owl does deserve a place on the protected list because of its aesthetic value. Who is there that does not receive a thrill of delight on seeing one of these white visitors from the north?

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SUMMER BIRDS OF THE GOTHIC AREA, GUNNISON COUNTY, COLORADO[1]

BY DOROTHY ANDERSON KNOX[2]

Plates 2, 3

SOME years ago Mr. Edward R. Warren of Colorado Springs, Colorado, published two articles in THE AUK (1916, 1928) on the birds of the Elk Mountain region of Gunnison County in western Colorado. These papers, so far as I have been able to discover, are the only records in print of the ornithology of this rugged and interesting section of Colorado.

It was the present writer's privilege to spend some six weeks during the summer of 1936 studying the birds of the north-central part of Gunnison County in the Elk Mountain Range. Although this study does not pretend to be as inclusive as that made by Mr. Warren, it seems that the scarcity of information concerning birds of this region lends it certain value.

How I came to attempt this study would perhaps lend a digressive introduction to the more scientific data to be presented herein. One of my former colleagues in the Department of Biology at Hood College, Dr. Mary Howe Schott, has been for some time a member of the staff at the Rocky Mountain Biological Station situated near Crested Butte, Colorado. This station, or laboratory, is owned and administered by an independent corporation whose members are, for the most part, scientists from colleges and universities of several states. The laboratory provides summer courses in biological sciences to both undergraduate and graduate college folk. A number of the latter group are carrying on research there in ecology, botany, mammalogy, and embryology. It was at Dr. Schott's suggestion that, since very little work had ever been done on the birds of that region, I should undertake a bird survey at the laboratory and, if possible, establish a bird-banding station there. The idea of working in a territory so little known to ornithologists appealed to me immensely, and plans were made to carry out these suggestions.

The idea met the approval of the U. S. Biological Survey and the Conservation Department of Colorado and bird-banding permits were soon granted.

[1] The present paper was sent to the late Dr. Glover Allen in 1937 at a time when he was not at his office to receive it, and, apparently, it could not be found thereafter. It has since come to light among other papers delivered to the present editor and with assurances from the author that publication is still desired, is presented herewith.—Ed.

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I arrived at the laboratory the last week in June to find that I was truly in a naturalist's paradise. The station occupies all that remains of the once thriving gold- and silver-mining town of Gothic, situated ten miles northwest of the town of Crested Butte. The exact geography of the Elk Mountain Range has been very adequately described by Mr. Warren in his first paper, so I shall not repeat it here. I should like, however, to give a rather detailed description of this small region which I studied, so that the reader may more fully understand the topography of the places referred to later.

Gothic nestles near the northwestern end of a long, fertile, meadowed valley through which the East River flows a serpentine course. This valley slopes upward from an altitude of not over 8,900 feet at its southern end to 9,500 feet at Gothic. It lies entirely within the boundaries of Gunnison National Forest. The boundaries of this valley are well marked by a giant stockade of majestic, multicolored, mountain peaks: Crested Butte Mountain to the south, Snodgrass, Gothic, and Baldy mountains to the west and northwest, and Avery, White Rock, Virginia, and Red Mountains to the east. All of these rise to alpine summits from 12,000 to 13,500 feet high.

Ecologically, this territory may be divided into the following life zones: Montane or Transition, altitude from 6,000 to 8,000 feet; Canadian, 8,000 to 10,500 feet; Hudsonian, 10,500 to 11,500 feet (timberline is found near the upper limit of this zone, the extreme limit of which is usually characterized by a strip of very dwarfed, gnarled spruce trees which grow in a peculiarly matted formation called Krumholtz); and Arctic-Alpine, which extends from 11,500 feet upward.

The dominant forest growth, which extends from the valley up to timberline, is Engelmann spruce, Douglas fir, aspen, and willow. Of these, the Engelmann spruce is the most abundant. Of the herbaceous plants, fungi, and mosses, there is seemingly an endless variety. In fact, variety in all things is what makes this region so intriguing. Within a five- to ten-mile radius in any direction, one may climb from the flower-carpeted meadows of the Canadian Zone up to the snows and sparse, stunted vegetation of the Arctic-Alpine Zone above timberline, or one may go lower to a typical Transition-Zone locale. In either case, one is tremendously impressed by the attendant changes in soil, rock formation, water supply and drainage, temperature, humidity, and altitude. Such diversity of habitat gave promise of abundant and varied plant and animal life—a promise generously fulfilled as the weeks passed.

(Upper figure) ROCKY MOUNTAIN BIOLOGICAL STATION; LOOKING EAST TOWARD CRESTED BUTTE MOUNTAIN, GUNNSION COUNTY, COLORADO.
(Lower figure) SOUTHERN SLOPE OF GOTHIC MOUNTAIN.

As I engaged in the ambitious task which I had set for myself, I began to realize that my mental equipment for such an undertaking was so limited as to be humorous. I was quite unfamiliar with western species of birds, since all of my rather limited experience in bird banding and scientific bird study had been confined to eastern states. Nor was there an ornithologist at the laboratory to whom I could look for assistance. All of this, however, but gave the problem that much more appeal, even though at the same time it made me realize that the work would have to be done with extreme care if the data obtained were to have any value.

The first objective, obviously, was to become familiar with western species. This was of necessity painstakingly slow work, for absolute accuracy in identification is required before a bird may be banded with a Biological Survey band. Several birds had to be released from the traps unbanded because I did not feel sufficiently sure of their identification. By dint of many repeated observations, I became familiar with some fifty species, most of which were found within a ten-mile radius of the laboratory.

So far as my next objective was concerned (*i.e.*, the establishment of a bird-banding station), the greatest difficulty was encountered in trapping the birds. I was equipped with both ground and tree types of wire traps, but only one of these, a warbler trap baited with running water, was at all successful. The other traps were all baited with grains, fruits, nuts, bread crumbs, and suet. Due to the superabundance of ground squirrels, chipmunks, and field mice, it was virtually an impossibility to keep bait of this sort in the traps for any length of time. The rodents, unlike the birds, were entirely unafraid of the traps, and stole the bait as regularly as I put it out. Remedies for this situation have been suggested, and I hope at some future time to try again and hope for better success. Frequently, seated at a distance, I watched a trap through my binoculars. A number of birds would approach the trap, and hop all around and over it, eating the grain which was outside (providing the squirrels had not arrived first). Very few, however, would venture within. The reason for this I could never quite fathom. It may have been the way the trap was constructed, or it may have been simply that the birds of this wild, uninhabited region were much less accustomed to man-made feeding boxes than are birds which live closer to human habitations. Furthermore, a great abundance of natural food, of both animal and vegetable types, doubtless helped distract them from this more artificial bait. Despite all this, a few birds were caught and banded, and

I feel that at least a start has been made toward the realization of my goals. Perhaps the most valuable data I have to submit is the list of species identified—a list to serve, along with Mr. Warren's, as the beginning of a much-needed check-list for this remote region.

To further reduce the number of errors and points of doubt in these data, I have discussed some of my observations with Mr. Robert Niedrach, Curator of Birds at the Colorado Museum of Natural History, at Denver, and also with his associate, Mr. Robert Potts. Mr. Potts, incidentally, has assisted Mr. Warren in some of his work in this territory, and they both visited our station briefly shortly before I left. Thanks to the courtesy of Mr. Niedrach I was able to check my notes with the collection of bird mounts and skins at the above-mentioned museum. I should like here to extend my appreciation to these two men for the many helpful suggestions they gave me.

Since my banding permits applied only to non-game birds, and my interests lay for the most part in this group, I spent very little time studying or even attempting to identify the game birds and birds of prey. Of those orders, only such species as happened to come within my range and were easily identified, have been included here. Following is the list of species identified, together with whatever field notes I deemed interesting or valuable.

AMERICAN BITTERN, *Botaurus lentiginosus.*—Within sight of the intersection of the Pittsburg Trail with the Crested Butte-Gothic road there is a very marshy flat. In passing this spot on several occasions, I saw a Bittern standing at the edge of this marsh. It was always seen at or near the same place and was always alone. Whether or not there may have been others inhabiting this same place, I do not know, as I never had much opportunity to investigate the area.

WILSON'S SNIPE, *Capella delicata.*—My only record for this was of one which I saw on the evening of August 11 at the edge of a small marsh near Gunnison. Although I saw none of them, some of the students at the station said they had seen birds which answered to this description not far from our camp.

SPOTTED SANDPIPER, *Actitis macularia.*—Several of these were observed whenever we visited any of the nearby lakes or ponds. At Emerald Lake, a well-named gem of a mountain lake lying at an altitude of approximately 10,000 feet and situated about five miles northwest of Gothic, Spotted Sandpipers were numerous and apparently were summer residents.

KILLDEER, *Oxyechus vociferus vociferus.*—A few of these were observed in and near the town of Crested Butte. They did not seem to be common.

DUSKY GROUSE, *Dendragapus obscurus obscurus.*—On July 5, a male Dusky Grouse fluttered to the ground directly in front of two of our staff members at the laboratory, giving every indication of being badly injured. They easily caught it and brought it to me. I examined it carefully, found no sign of injury, so released it. This was the first of this species I had seen. Later I saw others frequently in the valley between Gothic and Crested Butte.

WESTERN MOURNING DOVE, *Zenaidura macroura marginella.*—Mr. Warren (1916) reports that in 1915 this species was rare in the vicinity of Hillside Ranch, which is not far from Crested Butte. I noted that these doves were numerous in that vicinity when I was there.

WESTERN RED-TAILED HAWK, *Buteo borealis calurus.*—Fairly common throughout this area. I saw them in the chaparral country near the base of Mt. Marcellina, which is due west of Crested Butte, and they were occasionally observed around Gothic.

GOLDEN EAGLE, *Aquila chrysaëtos canadensis.*—Frequently observed soaring above us. I obtained an exceptionally good view of one on an afternoon when I was observing some warblers. I was hidden among some low aspens on the crest of a moraine. Happening to look up, I saw an eagle soaring slowly at some distance from me, but much closer to the earth than usual. I watched it through my binocular as it alighted in the top of a very tall, dead spruce. As it perched there, two Sparrow Hawks dashed out from somewhere and flew frantically at and about it for some time, obviously trying to harry it from the vicinity. To all of their pygmy efforts, the eagle paid majestic indifference. After resting there for some five or ten minutes, it soared casually off as it had come. The Sparrow Hawks followed it for a short distance, then returned to their own bailiwick, convinced, apparently, that the eagle had moved on. It was a thrilling little scene to watch.

DESERT SPARROW HAWK, *Falco sparverius phalaena.*—Very common throughout this region, especially in Transition and Canadian zones.

WESTERN BELTED KINGFISHER, *Megaceryle alcyon caurina.*—The only Kingfisher I saw was near Gunnison on August 11.

BATCHELDER'S WOODPECKER, *Dryobates pubescens leucurus.*—This species was not common in the Gothic region, but a few were observed.

RED-NAPED SAPSUCKER, *Sphyrapicus varius nuchalis.*—This was the most common woodpecker found in the region. We found two nesting pairs in the aspen groves above camp. Both these nests contained young birds in July.

RED-SHAFTED FLICKER, *Colaptes cafer collaris.*—A common summer resident at Gothic.

WESTERN NIGHTHAWK, *Chordeiles minor henryi*.—The first time I saw any Nighthawks was on the evening of July 29 at a look-out point on the Black Canyon near Curecanti, at an altitude of about 7,800 feet. There were a number of them flying about the canyon, feeding on the wing. On August 6 I observed a few of them circling over our camp at Gothic. I had not seen them there previously, and they did not seem to be as numerous at that altitude as in lower country.

BROAD-TAILED HUMMINGBIRD, *Selasphorus platycercus platycercus*.—This was the most common species of hummingbird around Gothic. Numbers of them were seen daily around our camp. One of the most interesting observations which I made of this species was the spectacular display of aëronautics put on by the males, apparently as part of their courtship behavior. The female would sit quietly on a branch somewhere, and a male would suddenly zoom up past her, so close as nearly to knock her from her perch, and straight on upwards until he was but a speck in the sky. Then he would turn, and in a fast 'power dive' would come to earth like a bullet, not breaking his head-on descent until close to the ground, when he would pull himself out of this dive and again climb and dive, uttering all the while a sort of clicking, high-pitched, metallic note. Occasionally, by way of variation, he would do a series of figure-eights and double loops, but his favorite performance seemed to be these great U-shaped dives. One morning I watched two males apparently vying with each other in an attempt to 'show off' before a rather indifferent female. It was a truly spectacular display, for it seemed that each bird nearly exhausted his repertoire of aërial stunts.

RUFOUS HUMMINGBIRD, *Selasphorus rufus*.—I saw none of this species during the first few weeks I was stationed at the laboratory. I identified the first one, a male, on July 23, and from then on I saw them daily. One pair appeared to be nesting in some willows at the edge of a meadow in camp, but I did not succeed in finding their nest. Although not so numerous as *S. platycercus*, they were quite common. On July 26 we tramped up past Emerald Lake and over Schofield Pass into Holy Cross National Forest. The Pass is at an altitude of 10,708 feet, and we observed countless Rufous Hummers all around there. They were more numerous there than at our camp in the valley below.

An amusing incident occurred on that trip which brought to mind Mrs. Bailey's statement (1935) that the Rufous Hummer is greatly attracted by anything bright red in color. We were sitting on a shale slide above Emerald Lake, resting and watching the play of light and

shadows on the lake below us. Suddenly, I was aware that a Rufous Hummer was suspended in the air, not over four feet away from me and directly at eye level. For what seemed like several minutes he hung there looking at me fixedly. It gave me a rather uncomfortable feeling to see that long beak aimed at, and so close to, my eyes. I thought of a bullet somehow miraculously arrested in its course in mid-air—a bullet with a lot of potential velocity still behind it. Finally it wheeled away, only to return shortly and again look me over. I tried stealthily to reach my camera in the knapsack on my back, but my motions drove him away and that time he did not return. I assumed he had been attracted by the bright red wool socks which showed above my boot-tops, but my companions insisted that it had been my sunburned nose (which had acquired so fiery a hue as to be the favorite butt of camp jokes) which the bird had mistaken for a clump of Gilia!

Both Warren (1916, 1928) and Babcock (1930) report this species as rare. I found it to be fairly common in the region last summer.

WESTERN FLYCATCHER, *Empidonax difficilis difficilis*.—Several were observed around Gothic, especially in the willows and low spruce trees near the streams.

I found at least two other species of flycatchers there; one, which was seen frequently, I thought was the Olive-sided Flycatcher, but I was unable to study it at sufficiently close range to be entirely sure of its identification. However, its behavior and general appearance tallied well with that species.

AMERICAN MAGPIE, *Pica pica hudsonia*.—Magpies were common in the country around Gunnison, and about as far north of there as Jack's Cabin, but I saw none around Crested Butte or Gothic. They seemed to be quite definitely restricted to Montane type of country.

ROCKY MOUNTAIN JAY, *Perisoreus canadensis capitalis*.—Although I saw none of these interesting birds in the immediate vicinity of our laboratory, they were fairly common in the dense spruce-fir forests above us.

CLARK'S NUTCRACKER, *Nucifraga columbiana*.—A flock of these was observed on July 8 passing over a spruce forest below Virginia Basin at an altitude of over 10,000 feet. This is my only record for this species.

ENGLISH SPARROW, *Passer domesticus domesticus*.—Accustomed as most easterners are to the hordes of ubiquitous English Sparrows in the cities, towns, and country throughout the east, I was impressed with their apparent scarcity in this part of Colorado. I saw but one or two of them in the town of Crested Butte and none at Gothic.

THICK-BILLED RED-WING, *Agelaius phoeniceus fortis.*—Although not generally common throughout this vicinity, there were a few places where they could always be seen in considerable numbers. One of these was in the meadows along the river, between Gothic and Emerald Lake, just below the entrance to the Biological Forest. This meadow lay at an altitude of between 9,500 and 10,000 feet.

WESTERN MEADOWLARK, *Sturnella neglecta.*—A common summer resident throughout this area. I was surprised to discover a very considerable altitudinal distribution of this species. Warren (1916) reports having seen it as far up as 9,500 feet. Babcock (1930) says they "occasionally wander up to 9,000 feet or higher." I first observed them at a much higher altitude on my first trip to Emerald Lake on July 5. On July 8, we 'hiked' up into Virginia Basin which lies at an altitude of 12,000 feet. The plaintive call of the meadowlark was one of the few sounds to break the awesome stillness of this spot. Hard-packed snow many feet in depth formed a glacial floor in the basin and, not over a few rods from its edge, meadowlarks were seen stalking about in the bordering meadow. I looked for nests but was unsuccessful in finding any. Meadowlarks were also frequently seen and heard around Gothic and Crested Butte. The interesting point here is that between Crested Butte and Virginia Basin is a rise in altitude of over 3,000 feet—a considerable range for one species to inhabit within one season. So far as I observed, only three other species shared a range so extensive—the White-crowned Sparrow, the Western Robin, and the Mountain Bluebird. I believe that the Desert Sparrow Hawk could also be added to this list, but I did not observe it myself at such great altitudes as have been reported by others.

BREWER'S BLACKBIRD, *Euphagus cyanocephalus.*—Common around Crested Butte and frequently observed in the meadow lands of the valley between there and Gothic. None seen above Gothic.

ROCKY MOUNTAIN PINE GROSBEAK, *Pinicola enucleator montana.*—A pair of these handsome birds were my constant neighbors throughout my stay at the Biological Station. Nearly every morning and evening I could find them in a certain clump of low spruces but a few rods farther south along the moraine on which my cabin stood. They were fairly tame and I could approach them within a few feet. They were undoubtedly summer residents there, although the species was not common.

CASSIN'S PURPLE FINCH, *Carpodacus cassini.*—I observed a few of these on different dates around a small corral in camp, but they did not seem to be very numerous.

Dr. John C. Johnson, Director of the Laboratory, reported that during the last week or two of June, prior to the opening of the laboratory, he had observed large flocks of Rosy Finches in camp. I judged from his description that these were either Purple Finches or Brown-capped Rosy Finches (*Leucosticte australis*). They had doubtless migrated to higher altitudes by the time I arrived, as I saw none of this latter species.

NORTHERN PINE SISKIN, *Spinus pinus pinus*.—In point of numbers, I believe these birds took first rank around Gothic. They were summer residents there and present in large numbers throughout July and until I left in August. They were nearly as obnoxious as the rodents in stealing the bait from my traps. I caught a few, however, and banded them.

WESTERN VESPER SPARROW, *Pooecetes gramineus confinis*.—A fairly common summer resident around Gothic.

WHITE-CROWNED SPARROW, *Zonotrichia leucophyrys leucophrys*.—Reference has already been made to the wide distribution of this species. I found several nesting pairs around the laboratory during July. Up in Virginia Basin I saw and heard numbers of them; they were obviously nesting there in the Krumholtz above timberline.

WESTERN CHIPPING SPARROW, *Spizella passerina arizonae*.—My first record of Chipping Sparrows is on July 21, when I saw them at the edge of an aspen grove in camp. Two or three of them were flitting around some scrub willows and weeds, feeding. I did not find many of them or see them often and do not know whether they were nesting or not.

GRAY-HEADED JUNCO, *Junco caniceps*.—Quite common around Gothic, but not so plentiful there as in the more heavily forested areas higher up. I found them nesting in Holy Cross National Forest.

MOUNTAIN SONG SPARROW, *Melospiza melodia fallax*.—I saw but few of this species and should say that it was not a common species there. My first observation was on July 12 and a few days later one was attracted to the porch of my cabin by some bread crumbs on the floor.

NORTHERN CLIFF SWALLOW, *Petrochelidon albifrons albifrons*.—Very common, not only at Gothic, but throughout that part of the country. I saw them in both Transition and Canadian life zones. In fact, this was one of the first species I learned to know in Colorado, for as the train on which I was traveling from Salida to Gunnison stopped at Marshall Pass, altitude 10,846 feet, I saw literally hundreds of the characteristic, jug-shaped nests plastered over the railroad water tower there, and swallows were darting all about.

On July 7 I observed a nest on one of our laboratory buildings that contained three young birds. It had been my intention to climb up some day and band these youngsters but, unfortunately, the nest was washed down by an extremely hard storm and when I found it next day the young birds were all dead.

BARN SWALLOW, *Hirundo erythrogaster*.—Barn Swallows seemed to be more typical of Montane than of Subalpine country. I saw them near Gunnison, but none in the Gothic region.

TREE SWALLOW, *Iridoprocne bicolor*.—Not at all common in this area, but I saw them occasionally in the valley southeast of Gothic.

VIOLET-GREEN SWALLOW, *Tachycineta thalassina lepida*.—As abundant around Gothic as the Cliff Swallows. Near Hot Springs, on Cement Creek, on July 22, I found an interesting association between Cliff and Violet-Green Swallows. There, under the overhanging edge of a large travertine formation and plastered to its walls and ceilings were hundreds of Cliff Swallow nests, occupied, so far as I could determine, by both species. The air was full of birds of both kinds, darting about together, and going in and out of these nests. The Violet-Green Swallows had apparently appropriated the old, unoccupied nests of the Cliff Swallows.

SHRIKE, *Lanius* (sp. ?).—On August 10, driving to Crested Butte, I saw a shrike on a fence beside the road. It was gone, however, before I could determine the species to which it belonged. However, I suspected that it was the White-rumped Shrike (*L. ludovicianus excubitorides*). This was the only shrike I saw in the region.

WESTERN WARBLING VIREO, *Vireo gilvus swainsoni*.—I saw a vireo for the first time that summer on July 21, busily hunting food in some aspen trees in camp. Thereafter I always found one or two around that same group of trees. I suspect they nested there.

ORANGE-CROWNED WARBLER, *Vermivora celata celata*.—On July 16 and 17, I caught, in one of the traps, two warblers which I tentatively identified as adult females of the genus *Vermivora*, but I could not determine the species. They were both released without being banded. On July 30, one of the students brought me a bird that had flown against a window and injured itself so that it was unable to fly. This bird was very similar to the two females which I had trapped and I was reasonably sure that it was of the same species—whatever that species was. This injured bird, however, was apparently an immature one, for there were evidences of considerable feather development. I killed it and, as best I could, prepared the skin for preservation and mailed it to Mr. Niedrach for final identification. He has identified it as an immature Orange-crowned Warbler. On August 5, I ob-

(Upper figure) LOOKING EAST FROM NEAR THE TOP OF BALDY MOUNTAIN.
(Lower figure) EMERALD LAKE, GUNNISON COUNTY, COLORADO.

served a male bird of this species feeding in the willow thicket below my cabin. I believe, therefore, that this species, although not common, was a summer resident and breeder there.

YELLOW WARBLER, *Dendroica aestiva.*—This and the Audubon's Warbler were our two most common warblers. Both species were found in considerable numbers, and both were nesting in and around our station.

AUDUBON'S WARBLER, *Dendroica auduboni auduboni.*—A very common summer resident.

MACGILLIVRAY'S WARBLER, *Oporornis tolmiei.*—On August 2, I saw a number of warblers flitting around in the spruce and low aspen trees around my cabin. It was a cloudy, rainy day, and visibility was rather poor, but I watched them for some time with my binocular. Although they seemed to be more or less together in one group, it was obvious that there were two quite distinct species there. I tentatively identified them as Macgillivray's and Pileolated Warblers. This identification was verified in the next few days. On August 4, I caught a female Macgillivray's Warbler in one of my traps and banded it. Thereafter I observed no more of this species around. Perhaps these were but a few stray migrants; I do not know.

NORTHERN PILEOLATED WARBLER, *Wilsonia pusilla pileolata.*—(See preceding paragraph.) On August 3, I caught a male Pileolated Warbler and banded it. Although this species first appeared in our vicinity apparently in company with the Macgillivray's Warblers, it stayed longer. I saw several of them around the same locale during the ensuing week, and they were still there when I left camp on August 11.

DIPPER, *Cinclus mexicanus unicolor.*—I frequently observed these very interesting birds along East River and its tributary, Copper Creek. One pair had a nest on the sheer, rocky wall of a natural mill-race on East River. When I first observed the nest on July 8 there were young in it. By the end of that month the nest was empty, although the adult birds were still in the vicinity.

WESTERN HOUSE WREN, *Troglodytes aëdon parkmani.*—A common summer resident in the Gothic area. Several nesting pairs were found in and around camp.

ROCKY MOUNTAIN CREEPER, *Certhia familiaris montana.*—First observed on July 23 when I saw a pair of them working on the trunks of the Spruce trees just outside my cabin. I saw them occasionally after that, but I should not call them common there.

MOUNTAIN CHICKADEE, *Penthestes gambeli gambeli.*—Quite common around Gothic and through the forest lands above, up to 10,500 feet.

WESTERN RUBY-CROWNED KINGLET, *Corthylio calendula.*—A fairly common summer resident and breeder around the Gothic area.

AUDUBON'S HERMIT THRUSH, *Hylocichla guttata auduboni.*—A common summer resident at Gothic and found all the way up to an altitude of a little over 10,000 feet. A breeding pair had a nest in a low spruce not far from my cabin. By the end of July the entire family, parents and young, was frequently to be seen quietly searching for food on the ground in that vicinity. I caught one of them in a trap and banded it.

WESTERN ROBIN, *Turdus migratorius propinquus.*—A common summer resident throughout this part of Colorado. I found them all the way from Montane country up to the glacial snows around Emerald Lake and Virginia Basin, and in considerable numbers (See paragraph on Western Meadowlark).

MOUNTAIN BLUEBIRD, *Sialia currucoides.*—As common a summer resident, and nearly as widely distributed, as the Robin. I have seen them at an altitude of a little over 12,000 feet, but Bailey reports that they go as far as 13,000. I noticed that like the Eastern Bluebird they seem to feel most at home close to human habitations. We had several pairs nesting in and around our laboratory buildings and they were fairly tame.

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TERRITORY AS A RESULT OF DESPOTISM AND SOCIAL ORGANIZATION IN GEESE

BY DALE W. JENKINS

INTRODUCTION

TERRITORIES of birds have been carefully studied and variously defined from the standpoint of the function and result of territory. These studies have been concerned with breeding, nesting, pairing,

adequate food supply, and space between birds. Few detailed or quantitative studies have been made upon one of the main criteria by which we are aware of the presence and extent of territories, namely the contact behavior and relationships with other birds of the same species or other species.

The purpose of the present study was to attempt to find and measure aggressiveness, individual relationships, and social organization in birds under, as nearly as possible, natural social conditions, and to observe territory throughout the year from this viewpoint. The study was made on a Ridgway Fellowship at the University of Chicago, during the academic year, 1939–40. It was undertaken at the suggestion and under the direction of Dr. W. C. Allee. Grateful acknowledgements are made to Dr. Allee, Mrs. M. M. Nice, the late Dr. G. K. Noble, Dr. H. H. Shoemaker, Dr. S. C. Kendeigh and Dr. N. E. Collias for suggestions and helpful criticisms, to Mr. R. E. Smart for permission to use the sanctuary, and to friends who helped make the observations.

The social organization of a few domesticated birds, such as chickens, canaries, and pigeons, and of captive birds, has been carefully studied during recent years, and the types of social relationship are fairly well known.

Two main types of intraspecific social organization have been found in birds. The first, known as 'peck right,' was reported by Schjelderup-Ebbe (1922) in flocks of the common chicken. When schematically developed, this is a straight-line type of hierarchy in which one bird is dominant over all the rest and pecks all birds below it; a second bird immediately below pecks all below it, and so on down the line. Quite a number of species have been found to have this type of social organization. The second type is known as 'peck dominance,' and was reported by Masure and Allee (1934) in the pigeon. This type of social organization presents no absolute peck right over subordinates, but is based on peck dominance after many conflicts. The bird which has won most frequently in a pair-contact cannot always be predicted to win. Peck dominance has also been reported in the Shell Parakeet by Masure and Allee (1934); in Ring Doves by Bennett (1939); and in the Canary by Shoemaker (1939). These two types of peck order are not always distinct and may intergrade.

MATERIALS AND METHODS

The present study was based on three native species of geese and four native species of ducks. These included six Blue Geese, *Chen*

caerulescens, two Lesser Snow Geese, *Chen h. hyperborea,* and twenty-six Canada Geese, *Branta c. canadensis.* Some of these had been raised in Minnesota and released in the Jackson Park Bird Sanctuary, Chicago, Illinois, where these observations were made. The geese raised young, which were included in the observation.

These geese were not tame, and if they were disturbed by intruders, the Canada and young Blue Geese flew away in characteristic V-formation and returned only after a considerable lapse of time. The other geese, having one wing tip clipped, fluttered over the water to the other side of the lake in the sanctuary.

Various ducks were also on the sanctuary lake, and these included the Mallard, *Anas p. platyrhynchos;* Lesser Scaup, *Nyroca affinis;* the Redhead, *Nyroca americana;* and the Wood Duck, *Aix sponsa.* The Mallards were mostly tame, but the other ducks were wild; many wild ducks came into the sanctuary and their relationships with the geese were observed.

Since the Blue and Snow Geese were usually found together and behaved similarly, they were considered together. The Blue Geese were divided into two groups—one a family composed of two parents and two offspring, and the other of a male and a female which were usually closely associated. The Snow Geese probably were both males or at least of the same sex. Since geese show no sexual dimorphism in plumage or size, the sex was not definitely ascertained until their mating in the spring, when the information given below was finally completed.

It was necessary to recognize each individual bird in order to establish its social position. Attempts to mark the individuals in various ways, such as by shooting dye from a distance with a blowgun and water pistol and by trapping the birds, failed because of their wildness. It was necessary to learn the birds by their plumage, actions, and other characteristics. The following tabulation shows the symbols used and the status and recognition marks of each goose:

BLUE GEESE

Family

C—Father of family; all white head; usually main guard.

A—Mother of family; head white with dark stripes on side.

S—Immature in family; head partly white; wings unclipped; sex unknown.

B—Immature in family; head all black, turned white in spring; sex unknown.

Mated Pair

M—Male and mate of W; head white; dark stripe on back; white-margined feathers.

W—Female and mate of M; head entirely white.

SNOW GEESE

L—Left wing tip only dark; probably male; stayed with M and W.
R—Right wing tip only dark; usually alone.

CANADA GEESE

Certain birds with deformities and size differences were recognized, but since all the birds could not be differentiated, the intraspecific social organization could not be determined.

Observations were made throughout an eight-month period extending from October 18, 1939, to June 15, 1940. The data in this paper are compiled from the observations of about 420 hours in the field. The average peck frequency or rate of conflict was about three pecks per hour. The habits and actions of the geese were observed at all hours of the day and night, but most of the observations were made at feeding time in the late afternoon. The geese were fed grain and bread which was scattered on an island while the geese rested in a lagoon. If the geese were very hungry they would accept food thrown to them from outside the sanctuary fence.

A typical peck was delivered by the dominant bird forcefully striking with its bill at the posterior part of the subordinate bird. The pecked bird quickly moved away, often shaking the rump and tail from side to side, which seemed to denote subordinance, defeat, or loss of food. Actual chasing of a subordinate bird also was counted as a display of dominance.

OBSERVATIONS AND DISCUSSION

The data reported here are observations of despotism and defense behavior of individual, pair, and family; the social inter-actions and resulting territories and social order of geese and ducks. Before the territorial aspects are discussed, the observations on the social organization and despotism will be presented. Observations of the geese and ducks appeared to show not only an intraspecific social organization between members of the same species, but also an interspecific social organization between different species. The intraspecific social organization was found within each of the three species of geese studied, while the interspecific social organization was found between the three species of geese, between the four species of ducks, and between the geese and ducks.

INTRASPECIFIC SOCIAL ORGANIZATION

Fall and Winter Peck Order.—A definite 'peck right' type of social organization, greatly modified by strong family ties and by mated pairs, was observed in the geese. This is shown in the left half of Table 1. No

despotism existed in the family C, A, S, B, nor between the pair of mated birds M and W.

TABLE 1

INTRASPECIFIC SOCIAL ORGANIZATION OF BLUE AND SNOW GEESE

Peck order in fall and winter			*Peck order in mating and nesting time*		
Bird	*Number pecked*	*Birds pecked*	*Bird*	*Number pecked*	*Birds pecked*
C	4	R W L M	C	6	R B S W L M
A	4	R W L M	A	0	
S	4	R W L M	M	4	R B S L
B	4	R W L M	L	4	R B S W
M	2	R L	W	2	R S
L	2	R W	S	0	
W	1	R	B	0	
R	0		R	0	

All members of the Blue Goose family were dominant over the rest of the geese and ducks during the fall and winter and until the time of mating, when the family relations were broken on April 2, 1940.

The pecks occurring in conflicts between individual birds for the five and one-half months during the fall and winter are summarized in Table 2.

TABLE 2

SUMMARY OF INTRASPECIFIC PECKS (FALL AND WINTER ONLY)

C pecks	A—0 times	S pecks	C—0 times	M pecks	L—42 times
	S—0		A—0		W—0
	B—0		B—0		R—9
	M—18		M—24		
	L—24		L—32	L pecks	W—12 times
	W—7		W—10		R—22
	R—10		R—15		
				W pecks	R—2 times
A pecks	C—0 times	B pecks	C—0 times		
	S—0		A—0	R pecks	——0 times
	B—0		S—2?		
	M—19		M—4		
	L—30		L—10		
	W—8		W—1		
	R—9		R—7		

This is a modified peck order due to the toleration among members of the family and between the birds of the mated pair. Two pecks were observed in the family by the immatures, B and S; however, this represented attempts by B to get food from the bill of S, rather than true pecks.

The members of the family were always together, and the paired M and W were usually together with L, while R, the Snow Goose at the bottom of the peck order, was nearly always driven away or alone.

The mother, A, had an antipathy against L when attempts were made to invade territory, and gave L thirty severe pecks. The male, M, of the mated pair pecked L forty-two times. Another antipathy occurred in Snow Geese; R was viciously pecked twenty-two times, chased, and kept from eating by L. Geese low in the peck order bothered the ducks more than the superiors did.

Organized Despotism and Facilitation.—Geese were often noticed to defend or take the part of a mate or of another goose. Table 3 shows all possible combinations of the family working together except C, B, S; C, A, B; and A, B, S. M, W, and L made an unstable group. The table may be expanded to read, *e.g.*, C, A, S, and B were observed to dominate 10 Canada Geese, once; 26 Canada Geese, twice; etc.

TABLE 3

COMBINATIONS AND FACILITATION

C, A, S, B pecks (10 Can.) 1; (26 Can.) 2; (4 Can.) 3; (L) 1; (M) 1.
C, A, S pecks (10 Can.) 1; (2 Can.) 1.
C, A pecks (2 Can.) 4; (MWL) 1; (L) 3; (M) 1.
C, B pecks (10 Can.) 1; (10 Mal.) 1.
C, S pecks (3 Can.) 1; (1 Can.) 2; (MWL) 1.
A, B pecks (3 Can.) 1; (L) 1.
B, S pecks (M) 1.

M, W, L pecks (1 Can.); (S) 1; (R) 3.
M, W pecks (3 Can.) 2; (1 Can.) 2; (L) 5.
W, L pecks (R) 1.
M, L pecks none

The family group showed organized despotism through its strong integration and coöperation, resulting in the dominance of the family. Division of labor was noticeable. The father, C, was usually on guard while the rest of the family was feeding, and defended the family mainly from the larger Canada Geese; the mother, A, often defended the family against the other Blue and Snow Geese. The offspring were kept between the parents. This well-integrated family might be called a family supraorganism, since it performs the activities of a larger, more complex individual, through coördination of its components. This results in the dominance of the family, which is of survival value to its members in that they can feed first and rest in the center of the aggregation, and are not pecked or chased.

This organized despotism appears rather unusual, since Schjelderup-

Ebbe (1935), who has studied peck order extensively in many species of birds, states: "The writer has not been able to prove that organized despotism (by agreement between two or more individuals) exists in birds."

Change of Peck Order in Spring.—Throughout the fall, winter, and early spring, the peck order remained the same. During the coldest weather, while the lake was frozen, the geese and ducks were often huddled in an aggregation at the edge of the ice. During the latter part of March, the male Blue and Canada Geese became more active, and their response to the females became more evident. The males began chasing each other, honking loudly, and, after chasing other geese or ducks, ran back to the female and gave a 'Triumphgeschrei,' in which both male and female stood facing each other and bowed their heads together, honking loudly all the while.

Fortunately, as a result of extended observation just at this time, I saw what was probably the first actual breaking up of the Blue Goose family. This occurred at 11:00 A. M. on April 2, a very warm day. The father, C, kept the mother, A, close and occasionally pecked their offspring, S and B. Finally B was chased away and then S. The offspring were pecked by Canada Geese and by M, W, and L. They attempted to rejoin the mother, A, but were driven away by the father, C. Later that day, at 5:00 P. M., the offspring were again tolerated, and the father defended them against other geese. From April 2 until April 30, the offspring were driven from the family on warm days, and were tolerated on the cold days of Chicago's variable climate. After April 30, the offspring were never tolerated, and C began courting and mating with A.

A new peck order, which lasted from April 2 until June 15, or longer, is given on the right side of Table 1. This table shows the reversals and loss of dominance of the immatures, S and B, when the family broke up. The parents, C and A, maintained top positions, while M, L, and W became dominant over S and B. Table 4 gives a summary of the pecks observed after the break-up of the family.

The immatures, S and B, were pecked by all but R. The immatures themselves pecked no other birds. A vicious fight occurred on April 30 between M and L. This was probably a challenge fight started by L, perhaps over M's mate, W, with which L had attempted to mate. This attempt of L, a Snow Goose, to mate with a female Blue Goose is very interesting. Some systematists regard the Blue Goose as a color phase of the Lesser Snow Goose, and hybrids are known.

TABLE 4

SUMMARY OF INTRASPECIFIC PECKS (APRIL 2, TO JUNE 15)

C pecks	A—0 times	M pecks	L—15 times	S pecks	B—0 times
	M—5		W—0		R—0
	L—43		S—2		
	W—3		B—1	B pecks	S—0 times
	S—16		R—1		R—0
	B—7				
	R—3	L pecks	W—5 times	R pecks	— —0 times
			S—13		
A pecks	C—0 times		B—0		
	M—0		R—2		
	L—1				
	W—0	W pecks	S—3 times		
	S—0		B—0		
	B—0		R—3		
	R—1				

INTERSPECIFIC SOCIAL ORGANIZATION

Interspecific social relations of birds have received little attention from ornithologists, except for chance observations at feeding stations and especially at nests. A very definite interspecific social organization was found between the groups and three species of geese and four species of ducks studied. This was a 'peck-right' type of social organization. The relationships of the birds in the interspecific peck order are shown in Table 5.

Size is an important factor but is not the only factor causing interspecific dominance. The members of the family of Blue Geese were dominant over the Canada Geese, which were almost twice the size of the Blue Geese. The parents, C and A, were still dominant, even after the break-up of the family.

A summary of the interspecific pecks for the whole period of observation is given in Table 6. Some reversals were observed which

TABLE 5

INTERSPECIFIC SOCIAL ORGANIZATION

Species	*Species and Groups pecked*
Fam. Blue	pecks Scaup, Wood, Redhead, Mallard, Snow G., M, W. Blue, Canada G.
Canada G.	pecks Scaup, Wood, Redhead, Mallard, Snow G., M, W. Blue
M, W. Blue	pecks Scaup, Wood, Mallard, Snow G.
Snow G.	pecks Scaup, Wood, Redhead, Mallard
Mallard	pecks Scaup, Wood, Redhead
Redhead	—
Wood	pecks Scaup
Scaup	—

TABLE 6

SUMMARY OF INTERSPECIFIC PECKS

Species or group	*Species pecked*	*Pecks*	*Back pecks*	*Species or group*	*Species pecked*	*Pecks*	*Back pecks*
Fam. Bl. G.	Canada G.	259	0	Snow G.	Mallard	28	0
	M, W Blue G.	99	6		Redhead	1	0
	Snow G.	185	13		Wood	3	0
	Mallard	44	0		Scaup	2	0
	Redhead	3	0				
	Wood	4	0	Mallard	Redhead	3	2
	Scaup	6	0		Wood	6	0
					Scaup	1	0
Canada G.	M, W Blue	65	5				
	Snow G.	87	18	Redhead	Wood	0	0
	Mallard	9	0		Scaup	0	0
	Redhead	3	0				
	Wood	6	0	Wood	Scaup	8	0
	Scaup	7	0				
				Scaup	—	0	0
M, W Blue G.	Snow G.	72	18				
	Mallard	6	0				
	Redhead	0	0				
	Wood	1	0				
	Scaup	2	0				

deserve explanation. The reversals against the family are due to the ostracizing of the immatures, S and B, at the beginning of the mating season.

Although the relationship among the Canada Geese, the Blue Geese, M and W, and the Snow Geese looks like peck dominance, it is because M, W, and L were dominant over a few crippled and small Canada Geese. There was no pecking back and forth, so that no true reversals were noticed in the geese. The relation between the Blue Geese, M and W, and Snow Geese, L and R, is due to L being dominant over W, while M was dominant over both L and R.

The relations of the ducks were not observed enough for any conclusions to be made. A duck with food was often chased by a subordinate. The order of feeding and the formation in moving toward food followed the sequence of the interspecific peck order in that the most dominant group fed first, followed by the next in dominance, down the scale.

TERRITORIAL RELATIONS

Territory is used here in a broad sense, being applicable in nonmating and non-nesting times as well as during mating and nesting

times. *It is any area in which despotism is shown resulting in the defense against other organisms, and is usually formed around some site or object such as nest, offspring, mate, food, etc. It is a result of despotism and social organization, and it may be fixed or evanescent in time and variable in size and shape.*

Establishment and maintenance of territorial boundaries appears to be the most important factor causing pecking in geese. However, the territory itself and the territorial boundaries are not the causes of pecking and social organization, but *are expressions or results of despotism or dominance, defense, or both.*

The family organization was the most important factor in producing despotism and defense pecking in the fall and winter, but in the spring the female mate became the most important, even to the extent of causing disintegration of the family.

Territories with definite boundaries are established and maintained around, or because of, despotism resulting in defense of: (1) the family including young; (2) the female mate; (3) the nest; (4) a place factor or certain location, or a position with reference to the rest of the birds; (5) a combination of these.

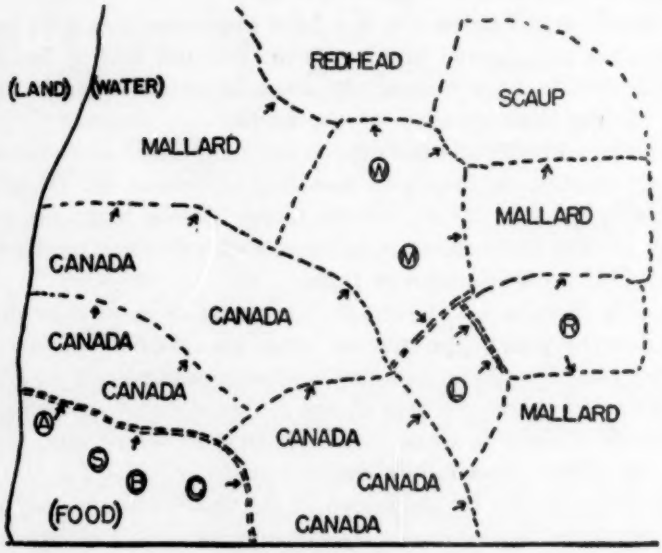
1. Family Territory.—The family territories of geese were definite, defended areas which also moved when the families moved. The territories varied in shape and size, and were maintained in all types of activities throughout the year except during the reproductive period. The families of Canada Geese broke up early in March and, as stated before, the Blue Goose family disintegrated on April 2.

All members of the family joined in the establishment and defense of the territorial boundaries. The coöperation of the Blue Goose family is shown in Table 3. As was stated before, the father, C, was usually on guard and defended the family from the Canada Geese, while the mother, A, often defended the family from the other Blue and Snow Geese. The offspring sometimes helped but were usually kept between the parents. A typical feeding territory of the family of Blue Geese is shown in Text-figure 1. Territorial boundaries of the families while feeding were well defined and the boundaries vigorously maintained.

While the families were resting and sleeping, the boundaries of territories were not so rigidly defended. Text-figure 2 shows the geese in a typical resting formation. The territory of the Blue Goose family was in the center of the group of birds and was about 35 feet in diameter, and it was defended about two hours. The other Blue and Snow Geese were tolerated in the territory of the family of Blue

Geese if the Canada Geese were not present. During the cooler days of autumn, the territory of the Blue Goose family was not maintained so rigidly, especially if the Canada Geese were not near.

The territories maintained by the families while moving were very interesting, and one common arrangement is shown in Text-figure 3. The swimming order was not always constant. In my observations, there seemed to be a tendency, when food furnished the stimulus to move to a new place, for the dominant group often to be out in front, but if the birds were moving to a resting place, the dominant Blue



TEXT-FIGURE 1

Territories of families, mates, and individuals while feeding. November 22, 1939.

Goose family frequently trailed the rest of the geese in the rear and center.

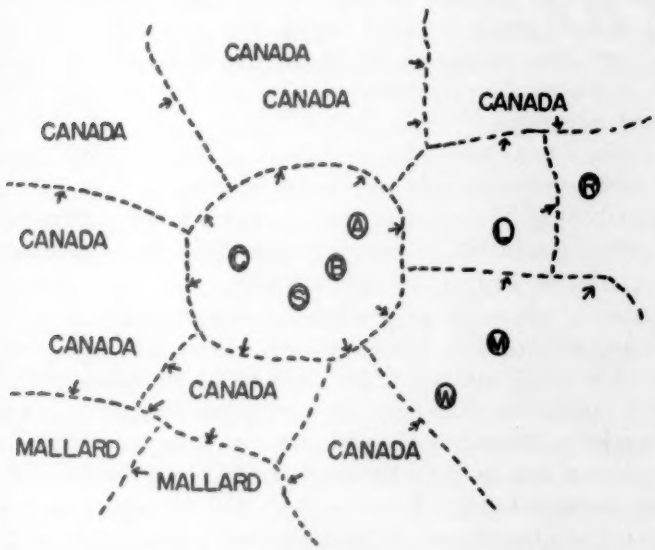
2. Mated-female Territory.—The mated female was the center of a territory which was vigorously and sometimes viciously defended by the mated male. This territory was a defended area of definite size, which moved around with the female. The mated female, which had previously defended her offspring, no longer took part in self defense or in maintaining boundaries.

The mated male viciously drove away all other birds attempting to enter the territory, and also the immatures attempting to rejoin their mother. The mated-female territory was defended throughout

the year if there was no family, but not as vigorously in the fall and winter as in the mating season.

There is a very strong bond between mates in geese; often when one is killed the survivor never remates.—Heinroth (1912). Geese are said to mate for life, and McAtee (1924) records a pair of Canada Geese mated for forty-two years and another pair mated for twenty years. In both cases, when one of the pair was killed, the mate died in a few months.

The size of the mated-female territory was only a few feet in di-



TEXT-FIGURE 2

Territories of groups while resting.

ameter early in the mating season, but increased later. It did not vary in size with the activities of feeding, resting, and moving as much as did the family territory. At courting time the other birds were chased away as far as fifty feet from the mated female. During several observed copulations of the Blue Geese, the mated-female territory was not large in diameter, and was located in the middle of the lake. The paired birds swam side by side dipping their bills to the water in unison and then lifting up and flapping their wings. The male then fluttered up on the back of the female and copulation occurred quickly. Several unsuccessful attempts had occurred previously.

The males of both geese and ducks were very active and aggressive

at mating time, and more despotism than usual was shown, while the females completely lost their aggressiveness.

These results of observations of birds under natural conditions agree well with the results of Allee, Collias, and Lutherman (1939), who have shown the effect of the male hormone, testosterone, in raising injected chickens to higher places in the peck order; and Bennett (1940), by injecting the same hormone into Ring Doves, caused them to peck more and become more dominant.

3. Nesting Territory.—A nest was an object around which there was a protected or defended area. This territory was often combined with the mated-female territory, which was very large at this time. The nest area was protected, but if the female wandered away from the nest, it, rather than the nest territory, was defended, at least early in the nesting season.

It has often been noticed that birds are dominant in the region of their nests, and much has been written about this. Lorenz (1931) found Jackdaws to be dominant in the region of their nests, and Shoemaker (1939) found that Canaries, subordinate in neutral territory, become dominant in their nesting territory.

The nests of the geese were scattered over the sanctuary and the neighboring area outside the sanctuary. None of these nests were close to each other, and since the nests were not built until all the geese were mated and dispersed, few geese came in contact, so that the nesting-territory boundaries could not be definitely located. The birds were secretive in their habits near the nests, but loud honking or calling indicated that a goose or duck had trespassed on a nesting territory. The Blue Geese, M and W, had a nest at the end of an island where all the geese had slept previously. In 1940, four young were raised by the pair, C and A, but these disappeared when half grown. M and W had no offspring. Several broods of Canada Geese were raised. The nesting territories were fixed in one place and were protected after mating until offspring appeared.

4. Place Factor (Certain location, or position with reference to the rest of the birds).—Several locations were sometimes defended by dominant geese, such as an area where food was thrown to the geese. The nest locality was a location which was defended. In swimming or walking to food, the front or foremost position of the group of birds was defended by the most dominant bird or birds. Sometimes in moving to a resting area, a bird that was perhaps low in the peck order and that was on guard at the previous location would lead the groups of birds, especially after giving an alarm. The Snow Goose,

L, while sixth in the intraspecific peck order, was a nervous bird and was often on guard and led the birds in moving.

5. Combination of the above factors.—The family, of course, was composed of both the offspring and the parents, which included the mated female. She and the nest formed a combination, because both were defended by the male at the same time, and perhaps a place factor would be included.

VARIABILITY OF TERRITORIES

These territories are not stationary areas without movable boundaries, but are variable in size, shape, and the amount of time they were defended. Some of the factors which cause, or are correlated with, the variability of time, size, and shape of the defended territories are: (1) time of the year; (2) temperature; (3) various activities of the birds, such as feeding, resting, sleeping, moving, mating, and nesting; and (4) sexual activity and social relations of the birds.

The effect of the time of the year is closely correlated with the effect of temperature which is, in turn, correlated with sexual activity and behavior. *The effect of the temperature was very evident, and the size of the territory was found to be approximately directly proportional to the average decrease of temperature in the autumn and average increase of temperature in the spring, slightly modified by daily temperature variations and the variation from morning to night.*

During very cold weather, when the lagoon was frozen, the geese and ducks formed a large aggregation. Despotism was at a minimum and social toleration was evident. The defended areas were very small and were reminiscent of the nesting territories of colonial-nesting species like terns and gulls. Temperature had a decided effect upon the activities of the geese. During the autumn the geese were more active on the warm days and were inactive when it was cool, especially during early morning and late evening. When the weather was warmer for a while during the winter, the aggregation broke up and the geese separated at noon into families and pairs, but became aggregated again in the evening.

The break-up of the family appeared to be dependent upon an increase in temperature correlated with the approach of the breeding season. The increase in the size of the territory culminated in the nest territory, and after nesting the family territory was established and the cycle started over again.

The territories of the groups while feeding were vigorously defended, and there was an order which the groups followed in feeding.

As soon as the dominant Blue Goose family finished feeding, the Canada Geese followed and then the mated pair, M and W, and in sequence down the interspecific peck order. Any deviation from this order caused pecking and fighting. If the geese were very hungry, many fights occurred at the tension lines. Text-figure 1 shows the relations of the birds while feeding.

The territories of the groups while resting and sleeping were not defended as rigidly as when feeding. Text-figure 2 shows the typical resting territories. A bird was always on guard, night and day, and any warning given when the birds were resting caused alertness and great alarm.

The guarding procedure was very interesting and was observed many times. When the geese were separated into families, one bird of each family usually was noticed with its head up, looking around, while the others fed or rested. In the Blue Goose family, C usually was on guard during the non-breeding season while the family fed or rested. This watchfulness was alternated with the mother, A, when C fed or rested. During the mating season the father, C, was continually on guard, and the female, A, never took an active part. These guarding activities were characteristic of the other families and pairs.

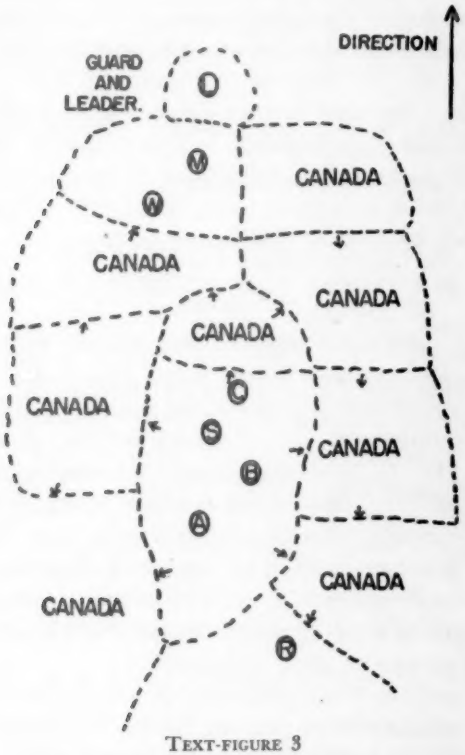
Guarding appears to be the primary defense mechanism of the territory and is performed by one bird of the group at a time. The guard of a dominant group serves a double function, that of locating danger and giving a warning to its own group, and of keeping the dominance of the group on display as a constant reminder to the birds lower in the peck order. Guarding in the subordinate groups appears to be watchfulness for the dominant groups and for outside danger.

At night the birds often slept on an island in the middle of the lagoon. The Blue and Snow Geese slept on shore with a bird on guard, L in two instances. The Canada Geese slept on the lake. In very cold weather all the geese and ducks rested and slept in a single, large, compact aggregation on ice or land, with no evident territorial boundaries. During this time, the whole aggregation often had only one guard. This guard usually was L, or some other nervous bird. In the large aggregation there was no correlation between guarding and dominance. If the whole group was frightened, most of the geese looked around and gradually resumed their resting or activities until only one bird remained on guard.

Moving territories of the groups were of special interest because the boundaries were maintained even though the geese were moving from

one area to another. Text-figure 3 shows a typical moving group of territories.

These territories were maintained whether the geese were walking on land or swimming in the lake. In flying, the young Blue Geese entered the symmetrical V-formation at any point. It was not determined whether territories existed in the air.



TEXT-FIGURE 3

Territories of groups while moving.

During the autumn the geese often made a circuit from the east side of the sanctuary in the morning, to the middle of the lake during midday, to the west side of the island in the evening to feed, and to an island in the middle of the lake at night, where they slept. There were no moving territories in the winter when the lake was frozen.

Perhaps the broad sense in which the word 'territory' is used in this paper will not be liked by some who wish to confine the word to the nesting area during the breeding cycle. However, certain definite

territories are defended and maintained in other parts of the year. A term other than territory might be used, or a description of the type of territory given (as in this paper) such as 'family territory' and 'feeding territory of the family.'

The territories were based on despotism or aggressiveness of the birds to each other, which was shown and measured in this study. After the territories were established they were of great value to the birds in preventing further despotism. These territories were also based on, and related to, the intraspecific and the interspecific social organizations.

The territories prevented further despotism by keeping birds separated from each other, and resulted in a remarkable organization that kept the rate of pecking and fighting of these 42 geese and over 50 ducks to about three pecks per hour, or slightly over 1200 pecks in the 420 observation hours of the eight-month period.

SUMMARY

1. A definite 'peck-right' type of intraspecific social organization (modified by family ties and mated pairs) was found in Blue, Snow, and Canada Geese, under approximately natural social conditions.

2. Family relations and ties are strong outside of the mating and nesting season. In the breeding season, the adult males become despotic and cause a disruption of the families, resulting in a change of peck order, due to the offspring being driven from the families.

3. There is definite evidence of organized despotism and facilitation, resulting in dominance of well coördinated groups as families.

4. An interspecific type of social organization was found between the species and groups of geese and ducks.

5. Establishment and maintenance of territorial boundaries appears to be the main cause of pecking, which is a display of despotism due to (a) family including young; (b) female mate; (c) food; (d) nest; (e) nesting and sleeping place; (f) position with reference to the rest of the birds; (g) some combination of these.

6. Territory is used here in a broad sense, being applicable in non-mating and non-nesting times, as well as during mating and nesting times. It is any area defended against other organisms, and is usually centered around some bird or birds or other object. It may be fixed or evanescent and variable in size and shape. The types recognized are: (a) family territory; (b) mated-female territory; (c) feeding territory; (d) nesting territory; (e) resting territory; (f) resting and sleeping territory; (g) moving territory.

7. The size and shape of the territories varied directly with the temperature (within limits), and with such activities of the geese as feeding, resting, sleeping, and moving.

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SIX YEARS WITH A BREWSTER'S WARBLER

BY T. DONALD CARTER

Plates 4, 5, 6

IN the 'Auk,' volume 40, July, 1923, R. H. Howland and I published an account of our discovery of a male Brewster's Warbler, *Vermivora pinus* × *chrysoptera*, mated to a female Golden-winged Warbler, *Vermivora chrysoptera*. We located his nest and brood and later captured and banded him and three of his young. At the time of the writing we supposed that our story was closed, but it proved to be the first chapter of a six-year acquaintance with this same bird. Although little of scientific interest was accomplished during this period, we both made some interesting notes of our experiences. Howland has placed his written observations in my hands and I am incorporating them along with mine.

I believe that a brief summary of the earlier article would be in order here so that we may have the full story.

The Wyanokie Plateau, in north-central Passaic County, New Jersey, is about forty miles northwest of New York City and two miles northwest of the town of Wanaque. Chiefly woodland, there are numerous clearings, swamps, and second growth, ideal country for the nesting of Blue-winged (*Vermivora pinus*) and Golden-winged Warblers, and as both of these species are common breeders here, the Brewster's and Lawrence's Warblers (*Vermivora pinus* × *chrysoptera*) would be expected to occur.

1922

On June 4, a Brewster's Warbler was observed where a wood road entered a clearing about five hundred feet in extent. At this point a branch road turned to the west, down a grassy slope and into an open swamp through which flowed a small brook. The swamp, about four acres in extent, was surrounded by second growth and was locally known as Hook Meadows. This entire area is now submerged by the waters of the Wanaque Reservoir.

The Brewster's Warbler evidently had a nest in this immediate vicinity, for he was carrying a green caterpillar. In a short time he flew down among some blackberry bushes and almost immediately reappeared without the worm. The nest was discovered with a brooding female Golden-winged Warbler upon it. On being flushed, she revealed five nestlings about one day old.

On June 10, six days later, accompanied by Mrs. Carter and Dr. G. Clyde Fisher, we returned to the nest to find that it had been

disturbed by a mountain blacksnake, *Elaphe obsoleta*. After a search, three of the young birds were discovered, caught, and banded. Upon catching the first of these, we noted the color of the plumage, put on its right leg band number ABBA 48864 and placed it in a small folding trap as an attraction for its parents. The male Brewster's Warbler entered the trap without much hesitation and was captured. Band number 48866 was attached to the left leg of this bird. Little did we guess that we would gaze on that band with intense interest in years to come. In color this bird was like a Golden-winged Warbler except that it lacked any sign of the black throat and had the narrow black mark, similar to that of a Blue-wing's, through the eye. He had no trace of any yellow on his breast and his wing-bars were as bright a yellow as in any Golden-winged Warbler. He was photographed and then liberated. During the afternoon he entered the trap and was caught on four different occasions. At no time did the female Golden-winged Warbler enter the trap. The two remaining young birds were banded with numbers 48865 and 48867. It has been our custom to band all young birds on the right leg and all adults on the left. As we examined these three young birds we noted a marked difference in their color. Number 48864 was a bit darker and colored as follows: Head and crown uniformly olive-green; back olive-green; rump brighter olive-green with yellow; tail olive-green like the head and back, with the feathers just breaking through the sheaths; under tail-coverts yellow; throat uniformly olive-green, becoming darker on the breast; sides and flanks whitish with a tinge of yellow; belly like the sides; wings bluish-gray, with outer webs slightly margined with olive-green and with two distinct, bright yellow bars. Numbers 48865 and 48867: Upper parts, wings and tail as in number 48864; throat and breast much lighter olive-green, almost grayish; breast somewhat darker than the throat but slightly tinged with yellow; sides and flanks whitish with a tinge of yellow; belly yellow.

On June 18, Howland again visited the spot. The Brewster's Warbler was again found and was seen to feed a young one which was flying well at this time. On July 8, we made another visit and were successful in finding only one young. This bird would not give us a view adequate enough to enable us to observe its plumage in detail.

1923

On June 3, Howland made a short visit to our clearing but saw no sign of our bird. On the southern end of Hook Meadows he found a singing, unbanded Brewster's Warbler. This bird appeared restless and did not remain in any definite locality.

On June 10, Mrs. Carter and I proceeded to the old nesting site of number 48866 and, finding no trace of him, we spent some time in the locality where Howland had observed the other Brewster's Warbler the week before. Not finding this bird, either, we returned to a spot about two hundred yards south of our clearing and sat down to eat our lunch. While we were watching some young Worm-eating Warblers and their parents, our attention was attracted to a bird above our heads. Its colors were difficult to observe in the poor light but there was something about it that held our attention. It finally flew down into a near-by bush and we could then see that it was a Brewster's Warbler, and almost immediately we saw its leg band. It soon found a green caterpillar and was joined by a female Golden-winged Warbler which also carried food. The Brewster's Warbler, the male, flew to the nest and fed. We had no difficulty in finding this nest at the base of a small birch sapling amidst a growth of ground pine, and found that it contained six young birds. After photographing the nest and young, we waited for Howland since he was expected that afternoon. After his arrival, we banded the young, numbers 24744–49. We judged these to be about six days old. After placing two in the trap, we soon had number 48866 again in our hands. We checked his number and photographed him. Looking at our watches, we observed that it was one year ago to the hour that we had had him in our hands before. We also captured his mate but she escaped before we could band her. Her breast and sides had a yellow wash showing that she was not a pure Golden-winged Warbler.

On June 14, Howland again visited the nest but found it empty. A short distance along the trail he discovered the female and later the male, and finally five of the young. All could fly and would not allow a close approach. On June 17, the parents and one of the young were observed by us. On this same day, Howland discovered a male Blue-winged Warbler and a female Golden-winged Warbler feeding a brood of young about two days out of their nest. He managed to catch and band the four young, numbers 48900 and 17012–14. Later, we returned to the spot with the traps and the female was taken and banded number 17015. The male, although he approached the trap, would not go in. This took place about two miles north of Hook Meadows. These young appeared identical in coloration. Their description follows: Crown and back of head olive-green; sides of head more yellowish olive-green; eye ring yellow; back grayish olive-green; throat like sides of head; breast the same but grayer; belly and sides greenish yellow, yellower on the belly; wings with primaries

and secondaries grayish, their outer webs edged with olive-green; inner webs margined with white, continuing over tips; upper wing-coverts grayish, with outer webs tinged with olive-green; tips, which form widely separated wing-bars, yellowish white; rump grayish olive-green; under tail-coverts yellow.

On June 30, accompanied by Mrs. Carter and Rudyerd Boulton, I returned but could find no evidence of the Brewster's family. A number of Golden-winged Warblers were about and one fledgling in particular was of interest. The breast was yellow on the sides with a grayish white streak down the center. The back of this bird appeared to be more greenish than the olive-green of the young of the typical Golden-winged Warbler. The bird was evidently going through its post-juvenal molt and showed a distinct black patch on its throat. It was being fed by a typical Golden-winged Warbler. On July 4, Mrs. Carter and I were still unable to find any of our family although the trees seemed alive with young warblers. We figured that there were about fifteen birds in the flock. There were at least three adult male Golden-winged Warblers and one Blue-winged Warbler feeding young birds. Unfortunately, we were unable to note the color of the young fed by the latter. The young Golden-winged Warbler males now appeared similar in color to the adults.

1924

On May 30, Mrs. Carter and I returned to our hunting grounds. We found a male Blue-winged Warbler which had evidently usurped the old nesting site, for he was observed chasing a Hooded Warbler (*Wilsonia mitrata*) and also other small birds. A little discouraged, we vainly searched the near-by territory.

On June 1, 7, and 8, we scoured the country but with no success as far as number 48866 was concerned. We did discover a singing Lawrence's Warbler in a cedar field about a quarter of a mile away and saw it give chase to a female Golden-winged Warbler.

On June 14, Mrs. Carter and I arrived at Wyanokie ready to spend the night. After a search along the trail, we walked into an opening about fifty feet from the path and one hundred feet from the original nest site. Here we were greeted by a scolding bird and, looking up, saw the Brewster's Warbler for the third consecutive year. After a wait of about fifteen minutes, he flew into the underbrush and we soon found the nest with six well-developed young. Again his mate was a Golden-winged Warbler. As Howland was expected at daybreak next morning and as it was too dark for photography, we de-

cided not to disturb the warblers at this time. The next morning, June 15, Howland arrived and we told him the good news. As it was still rather dark, we decided to pay the Lawence's Warbler a visit and return when there was better light. A fleeting view of the Lawrence's Warbler was all we obtained that morning. Returning to the Brewster's Warbler nest, we found it empty; the young had left. After a diligent search, five of the young were captured and banded, numbers 46518–20 and 46522–23. Number 46522 was a bit brighter underneath and a bit greener above than its nest-mates. After setting the trap, we soon caught the female Golden-winged Warbler and banded her number 46521. She showed no trace of yellow on her breast as was the case with last year's mate. Later, number 48866 was caught and photographed and his number checked.

On June 18, Howland went to Wyanokie alone. He found the Brewster's Warbler and his mate near their nest site and then went over to see if he could find the Lawrence's Warbler. In this he was successful, not only in finding the male but also in finding and capturing three of the young and both parents. The female proved to be a Golden-winged Warbler. All of these were banded. The female had her lower breast and belly washed with yellow. All the young appeared to be similar in color: Crown and back of head rich olive-green; cheeks grayer olive-green; back like the crown; rump a bit yellower; tail blue-gray; until tail-coverts yellow; throat grayish olive-green; breast brighter than the throat, slightly yellowish; sides yellowish white; belly bright yellow; primaries and secondaries bluish gray, their inner webs and tips margined with whitish, outer webs margined with olive-green; upper wing-coverts bluish gray, outer webs tinged with olive-green; tips bright yellow. The Lawrence's Warbler was heard to sing, besides a typical Blue-winged Warbler song, a more prolonged song approaching that of a Golden-winged Warbler. Howland also found a pair of Blue-winged Warblers with their young near the spot where number 48866 had nested the previous year. He managed to capture two of the young, which must have left the nest two or three days before. These two were banded numbers 82415–16. Their description follows: Crown and back of head dull olive-green; cheeks brighter; back and rump the same as the crown; throat, breast and sides the same as the cheeks, very little brighter (yellowish) than the upper parts; belly yellow; under tail-coverts yellow; tail the same as the wings; upper wing-coverts dull slate, outer webs olive-green, tips pale yellowish white; primaries and secondaries dull slate, their outer webs tinged with olive-green, inner webs margined with whitish.

NEST OF BREWSTER'S AND GOLDEN-WINGED WARBLER: WITH EGGS, JUNE 14, 1925; WITH YOUNG, JUNE 21, 1925.

On June 19, we went up to the Wyanokie Plateau but accomplished nothing as far as number 48866 was concerned. On June 21, Howland, Howard Cleaves and I again went up and found the Brewster's Warbler and his mate near the site of the 1923 nest but could discover none of the young birds; and another visit on June 22 accomplished nothing.

1925

On May 24, Mrs. Carter and I again visited Wyanokie Plateau and arrived at the Brewster's 1922 nesting site at 11:15 A. M. A chipping sound attracted our attention and we discovered a female Hooded Warbler, which proved to be a bird I had banded in 1923. She also has had an interesting history which I published in the 'Bulletin of the Northeastern Bird-banding Association,' 4 (3): 95–97, July, 1928. While watching her, our attention was attracted to a flock of small birds in a white oak tree a little farther down the path, very near the 1923 nesting site of number 48866. Almost the first bird we picked out was a Brewster's Warbler and before we focused the glasses on him we were sure that we recognized him. And then we saw his leg band. We also noted that the feathers on his crown had a roughened appearance, which was especially noticeable when he was seen in profile. He then flew across the path and joined some Redstarts, Black and White Warblers, Worm-eating Warblers, and other small birds feeding in the trees. Soon he was back over our heads, later to disappear. Before we left, he again returned to the tree. By this time it was raining, so we moved over to the cedar field where we had found the Lawrence's Warbler the previous year. We located five singing Golden-winged Warblers and, upon hearing an odd Blue-winged Warbler's song, we investigated and discovered a Blue-winged Warbler which had distinct, yellow wing-bars. Two good views of this bird showed us that it was unbanded and that the wing-bars were separated as in a Blue-winged Warbler but that they were distinctly yellow. By this time it was raining so hard that we decided to return home. On May 30, accompanied by Howland and Charles Breder, Mrs. Carter and I returned to our 'stamping grounds.' The Brewster's Warbler was located in the same tree in which we had found him on May 24. He later disappeared but was found again and was heard to sing for the first time since our introduction three years before. He sang but the first two and three notes of a Golden-winged Warbler's song, instead of the accustomed four notes. Continuing down the trail, we heard a Golden-winged Warbler's song of three and four notes. Upon investigating, we found a Golden-winged

Warbler whose breast was strongly washed with yellow. Across the brook we discovered another Golden-winged Warbler with yellow on its breast, which was banded on the right leg, one of the birds we had banded as a fledgling on a previous year. He sang the regular Golden-winged Warbler's song. There were also another Golden-winged Warbler and a Blue-winged Warbler in this locality. We now returned to the Brewster's Warbler and found him singing the chittering song that usually is heard late in the season.

On May 31, it was late before we could look for our warblers and little was accomplished. The Brewster's Warbler was not seen. On June 6, we did not arrive until 3:15 P. M., but found the Brewster's Warbler almost immediately between his 1923 nesting place and the swamp. It was very hot and few birds were singing. I saw the unbanded, yellow-breasted Golden-winged Warbler found the previous week, singing in the same tree. However, we did not see the banded one. On June 7, Howland and I were at the site by daylight. We heard number 48866 singing as we neared the spot. We then moved on to the cedar field and again found the yellow-winged Blue-winged Warbler. Returning to Hook Meadows we discovered at least four male Golden-winged Warblers, two of which had some yellow on their breasts. None was banded. The Brewster's Warbler was singing when we returned to him at about 5:00 P. M. His song consisted mostly of two syllables, *zu-e-e ze*. Once in a while he added a second *ze* on the end, making a three-syllabled song.

On June 13, Bertram Bruestle accompanied Mrs. Carter and me to visit the Brewster's Warbler. Shortly after arriving, we heard the bird singing his three-note song. We watched him for some time and concluded that he was not feeding young. After a careful search in the likely places near-by, Bruestle flushed a Golden-winged Warbler from a nest, which we found contained four eggs. This nest was about twenty-five feet from the main path and about one hundred feet south of the 1923 site. The Brewster's Warbler was not perturbed by our finding this nest, so we decided to wait until the next day to discover whether the nest might be his.

On June 14 there was rain, and it was not until 1:00 P. M. that we again visited the nest discovered the previous day. The sun came out as we approached. The female flushed as we came near, and the Brewster's Warbler immediately joined her in notes of distress. Before we were forced to leave for home on account of a heavy shower, we were all well-satisfied that the nest belonged to the Brewster's Warbler. On June 20, Mrs. Howland, Mrs. Carter, Howland and I

visited the Brewster's Warbler locality at a little after 3:00 P. M. but rain prevented our accomplishing anything. The Howlands went home, but Mrs. Carter and I camped for the night.

On June 21, Bruestle came up in the morning. The eggs of the Brewster's Warbler had hatched and the young were about three days old. I took a photograph of the young birds in the nest. A brood of Golden-winged Warblers was flying about the locality but they were too old to be caught. Another rain forced us to leave for home.

On June 24, I missed the early train and Howland was already making observations when I arrived. All was well at the Brewster's Warbler nest and I set up the umbrella blind with the hope of securing some pictures. In an hour's time I went into the blind and after a short wait, number 48866 came down and fed the young. I had a very clear view of him, being about six feet away. I also had an opportunity to examine his crown, which showed a distinct scar, with roughened feathers. He had evidently met with some accident since last year. The female was more timid but eventually came. She proved to be a very dark Golden-winged Warbler; her breast was a very dark gray, quite in contrast to the white breast of the male. Just before she fed, she gave a series of very soft *zees,* repeated about five times. In the two hours I was in the blind, the female fed only three times; the male made three trips to her one. As it had now clouded over, making photography impossible, we banded the young numbers 46532–35 and left for home.

On June 27, Mrs. Carter and I arrived late in the afternoon but saw nothing of our birds. The young birds had left the nest. Later we were joined by Bruestle and camped out for the night. The next morning, June 28, Howland joined us and we soon discovered one of the banded young. It was placed in the trap and number 48866 was soon afterward made captive. His number was checked again and he was photographed to show the scar on his head. The young bird also was photographed. The young Golden-winged Warblers, which had left the nest about two weeks before, were passing through their post-juvenal molt and many of them showed the black throat of their parents.

1926

On May 30, alone, I visited Hook Meadows. It was very warm, few birds were singing, and it was not until 5:00 P. M. that I heard a note from a Blue-winged or Golden-winged Warbler. Nothing was accomplished.

On June 6, it was raining when I arrived at Hook Meadows. I

waited for about twenty minutes until the weather had cleared and then heard a bird give the three-note song which had a familiar sound, and I discovered the Brewster's Warbler in the old dead tree, near the gate, where he had spent much of his time the year before. In the afternoon, Howland joined me and he, too, saw the bird and the band. For the fifth year number 48866 had returned.

On June 13, Howland had arrived and left before Mrs. Carter and I put in our appearance. I found a note from his as follows: "Don—No nest. 48866 has been singing almost the whole length of the bog, centering at the big tree at foot of bank, occasionally ducking into the woods just north of path leading to spring. But here is news! There is another Brewster here. Have not been able to see any band, in fact feel sure there is none. The two birds have been mixed up quite a bit, 48866 frequently chasing. The new bird ranges farther north. Have seen no females. A Blue-wing, across the meadow, is of no interest. Have not looked into your Hooded but have heard song. New Brewster rather gray throat but both birds singing alike, three and four-note Golden-winged song. The new bird mostly four, 48866 mostly three. It is up to you to find out what is what around here. R. H."

The first bird I found was the new Brewster's Warbler. He soon flew south, and then a bird sang the three-note song near the spring, and I located number 48866. The scar on his head was still noticeable. I decided that I would spend my entire day trying to track down his nest. He would fly from the spring to the swamp, a distance of perhaps two hundred rods, and back again. He generally sang the Golden-winged Warbler's three-note song, but at times the four. I kept the Brewster's Warbler under observation all afternoon, and from his actions I knew that he was not caring for a family of young. There was a possibility that his mate was still sitting but, if so, she would be rather late. I saw no sign of a female Golden-winged Warbler.

On June 20, Mrs. Carter, Howland and I returned to find number 48866 acting as he had on June 13, still singing. Howland left early but we stayed on and, after another day similar to that of the week before, we came to the conclusion that the bird had no home ties. I believe that if he had tried earlier in the season his nest had been broken up.

On June 27 and July 5, we made two more visits and did not find our bird on either occasion.

1927

On May 30, Mrs. Carter, Howland and I arrived at Hook Meadows at 9:15 A. M. Much of our old territory had been cut away for the

BREWSTER'S WARBLER AT NEST, JUNE 24, 1925. (Left) FEEDING YOUNG; GOLDEN-WINGED WARBLER IN UPPER RIGHT CORNER. (Right) PAUSING AFTER FEEDING YOUNG.

coming Wanaque Reservoir. Two of the Brewster's nesting sites were gone. We were therefore doubtful as to our ever finding number 48866 again. Almost as soon as we reached the spot we heard a three-note Golden-winged Warbler's song. Following it, Mrs. Carter found the singing bird. It was a Brewster's Warbler and as it flew, I was very sure that I saw the glint of a band. A few minutes later a bird flew into view and proved to be an unbanded Brewster's Warbler. I felt sure that this was a second bird. Howland followed this male as it flew to the southern end of the swamp. A moment later I heard the three-note song in a nearby tree and with my glasses I obtained an excellent view of the band and also of the scarred crown. There was no denying it this time. Throughout the afternoon, number 48866 spent most of his time in the swamp, ranging occasionally back into the east woods.

On June 4, Howland paid a short visit in the rain and found both Brewster's Warblers in the swamp but was unable to make observations on account of the weather.

On June 5, Mrs. Carter and I were back to our old 'stamping grounds' and saw both Brewster's Warblers and an unbanded Lawrence's Warbler on the ridge not far away. Howland later was with us. He had made a visit to a spot about a mile and a half from Hook Meadows and there made the discovery of a Brewster's Warbler with a band on the right leg. This bird was undoubtedly one of the young we had banded, but whether it was descended from number 48866 we had no way of making sure. He also found a female Golden-winged Warbler on her nest with four eggs. A male Golden-winged Warbler also was there. No time was left to investigate that afternoon but we hoped that the nest would prove to belong to the Brewster's Warbler so that we could catch him and secure his number.

On June 12, I arrived with Mrs. Carter and Howland. Number 48866 and the other Brewster's Warbler were in the swamp. Number 48866 divided his time between the east woods and the meadow. On the southeast corner of the east woods, Mrs. Carter found a nest which contained two warbler eggs and one egg of a Cowbird. No bird was near. Somewhat earlier, at the edge of the woods, I had found a male Lawrence's Warbler with yellow wing-bars. This bird was later seen by Howland and had no band. I also discovered, on the hillside northeast of the swamp, a male Golden-winged Warbler with yellowish under parts. This, too, was unbanded. After removing the Cowbird's egg, we visited the place where Howland had observed the banded Brewster's Warbler. We found the nesting Golden-winged

Warbler and her mate proved to be a Golden-winged Warbler. There was no sign of the Brewster's Warbler about.

On June 13, Mrs. Carter, Howland and I returned to Hook Meadows and found an unbanded female Golden-winged Warbler on the nest that Mrs. Carter had discovered. There were now three eggs, and the female appeared to be sitting. Number 48866 was in the swamp, circling into the east woods. He seldom sang near his nest. It took considerable time for us to establish the fact that the nest belonged to him but eventually he came and fed the female while she was on the nest. This he did several times while we were watching. We all saw the band, and the scar on the head was unmistakable. He was singing as usual. The other Brewster's Warbler was now ranging on the other side of the swamp. The woods were rapidly being cut from the north and we were sure that the nest would be destroyed, so we spent the afternoon trying to find a Golden-winged Warbler's nest which contained eggs, into which we could transfer the Brewster's Warbler's eggs. All the nests we found now contained young birds.

On June 19, Mrs. Carter, Howland and I went to Hook Meadows. The woodmen had made greater progress than we had expected. All was gone. We searched for the nest but no trace of it remained. Number 48866 was in the swamp singing the three and four-note songs. He flew to the old spot, alighting in the one remaining tree near-by, and sang. It began to rain hard and we left, sick at heart.

On June 26, Howland and I visited Hook Meadows for about one hour and a half directly after dawn. No signs of number 48866 or any other hybrids. More of the woods had been cut away. On July 4, Howland paid one more visit. The woods of the locality were all down and no birds remained.

The following spring the whole region was flooded.

SUMMARY

In the six years that this Brewster's Warbler was under observation, his nest was discovered five times, he was captured and had his number checked four times, and eighteen of his young were banded. In each of the five years that his nest was discovered, he was found to be mated to a female Golden-winged Warbler. Two of these females were captured and examined and one was banded. A third was watched at a distance of six feet. The three had distinct characteristics. As far as we could judge, he had a different mate each year. A male Lawrence's Warbler, his Golden-winged Warbler mate, and their young were banded. Two other Lawrence's Warblers were observed as well

as four other Brewster's Warblers. A female Golden-winged Warbler mated to a male Blue-winged Warbler was banded and also her young. Numerous birds were observed, which were not pure-blooded, such as Golden-winged Warblers with distinct yellow coloring on their breasts and a Blue-winged Warbler with distinct, yellow wing-bars. Two birds that had been banded previously as young birds were noted, a Brewster's Warbler and a Golden-winged Warbler with a distinctly yellow breast. However, we were unable to prove that either of these was the young of our Brewster's Warbler.

Howland and I both owe a deep debt of gratitude to John T. Nichols for his interest and help to us while we were carrying on our observations. Consequently, I asked him if he would read over my manuscript and comment upon it and, if he thought that there was enough material contained in the article, write a short hypothesis. His conclusions follow:

"We assume that Brewster's and Lawrence's Warblers are dominant and recessive hybrids by alternative inheritance, a justifiable assumption in view of our present knowledge, though it still leaves interesting observed facts about them to be explained. A second assumption for the analyses of the above data, that Blue-winged and Golden-winged plumaged birds involved were essentially homozygous, and that the Brewster's Warbler (No. 48866) was a first generation hybrid, is no more than probable. Hence conclusions reached are variously tentative. The Golden-winged banded as a young bird, observed in 1925, might have been one of fourteen Brewster's × Golden-winged young, or of three Lawrence's × Golden-winged young previously banded. The Brewster's banded as a young bird, observed in 1927, might have been one of eighteen Brewster's × Golden-winged young or of four Blue-winged × Golden-winged young previously banded. There would seem to be about four chances to one that either of these would be of the Brewster's × Golden-winged young, and better than two to one that both were. The frequency of Golden-wings with more or less yellow breasts and occurrence of a Blue-wing with yellow wing-bars in this area of active hybridization indicate a limited amount of blending in characters of the two which go mainly by alternative inheritance. The fact that Brewster's No. 48866 male, likely a first generation hybrid, had clear white under parts, and that the Golden-wing banded as a young bird (probably the young of the Brewster's but certainly with hybrid parentage) had yellow on the breast suggests that such blending is greater in later than in first generation hybrids, a matter of theoretical interest.

"Unfortunately, these hybrid Warblers have nondescript nestling plumages, olive-green above, more or less so on throat and breast; belly more or less yellowish; under tail-coverts yellow; wing-bars yellow or yellowish white. They do not declare themselves until the post-juvenal molt, at about which time it becomes impossible to keep track of banded young. A study of nestling plumages, however, has some interest.

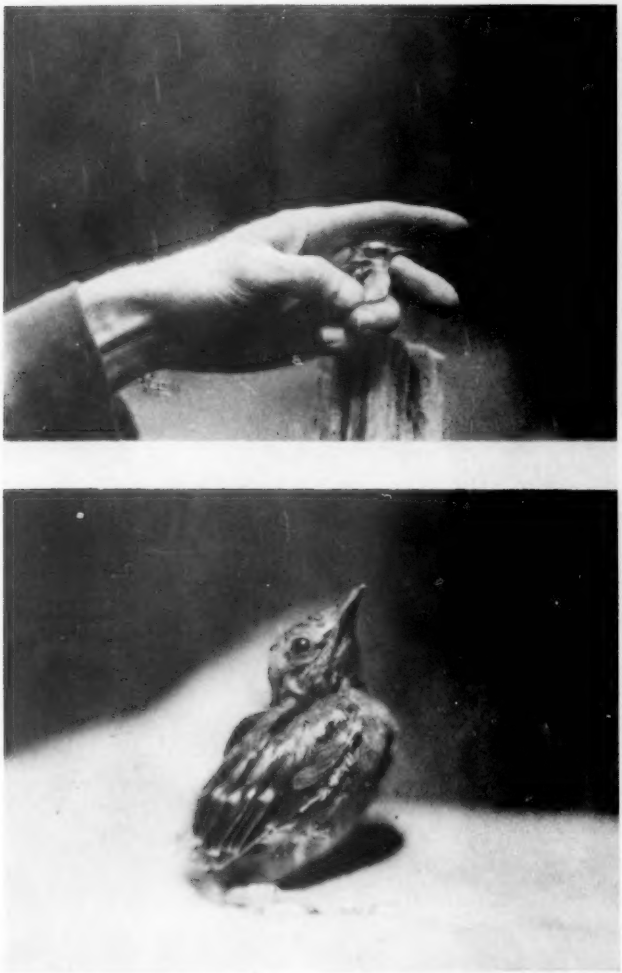
"In the eighteen Brewster's × Golden-winged young that were handled, colors of three of the first brood of three were carefully noted, and those of five of another brood less carefully compared; and no new differences were noticed in other broods. These nestlings all had yellow wing-bars. They were of two differentiable types. In the first, the throat was uniform olive-green, darker on the breast; the belly whitish with a tinge of yellow. In the second, the throat and breast were lighter olive-green; the breast had a slight tinge of yellow; belly yellow. In the 1922 brood there were one dark and two bright birds; in the 1924 brood, four dark and one bright; total, five dark and three bright. Supposing a first generation Brewster's and a homozygous Golden-winged, the young should average half Brewster's and half Golden-winged.

"A brood of three Lawrence's × Golden-winged nestlings were alike, and in no essential respect different from the bright Brewster's × Golden-winged nestlings.

"For data on the Golden-winged × Golden-winged nestling plumage, we have a single collected specimen in the American Museum from this same hybridization locality. It is very like the dark Brewster's × Golden-winged described, with back and rump somewhat grayer than the crown; under tail-coverts (some feathers may be lost) less yellow. Its wing-bars, however, are yellowish white, not yellow!

"Two young Blue-winged × Blue-winged nestlings of the same brood were alike. They had pale yellowish white wing-bars; crown, back and rump dull olive-green; cheeks, throat, breast and sides a little brighter, more yellowish; belly yellow. Compared with Brewster's and Lawrence's nestlings as described, their upper parts were duller and more uniform. A specimen of comparable age from Yonkers, N. Y., in the American Museum, is evidently yellower—yellowish olive-green, throat paler, belly yellower, wing-bars pale yellowish white.

"Now for the description of a brood of four Blue-winged × Golden-winged nestlings (the two forms whence the original cross). These are alike, but instead of resembling either of the Brewster's × Golden-winged types, they had yellowish white instead of yellow wing-bars,



(Above) ADULT BREWSTER'S WARBLER WITH SCAR ON HEAD (see text), JUNE 27, 1925. (Below) YOUNG OF BREWSTER'S × GOLDEN-WINGED WARBLER, JUNE 10, 1922.

and were also yellower on the side of the head, with a yellow eye-ring; grayer on the back and rump; throat yellowish olive-green; the belly yellower. This is a fair-blended intermediate between Golden-winged and Blue-winged nestlings.

"These Blue-winged × Golden-winged nestlings should have been Brewster's. But so should one of the types of Brewster's × Golden-winged nestlings. That their plumage differed markedly from either indicates that nestling and final plumage are not clearly linked in heredity, and suggests that with nestling plumage, blending is less in later than in first generation hybrids.

"Incidentally, we find an entry in our notes concerning a young Lawrence's (male) × Blue-winged (female) Warbler nestling on Long Island (Blue-winged territory), that it was olive in color, green above, yellow below, wing with two narrow, grayish white bars.

"Lawrence's (in final plumage) is the recessive hybrid, but it should be noticed that, mated with a Golden-winged which has yellow wing-bars, it gave a nestling with yellower wing-bars than the nestling Golden-wing, mated with a Blue-wing which has grayish wing-bars, a nestling with grayer wing-bars than the nestling Blue-wing.

"The Brewster's Warbler locality was Golden-winged territory, although a few Blue-wings nested there and there was Blue-wing territory not far distant. This is usually the case where Blue-wing × Golden-wing crosses occur. It should be noticed that in all mixed nestlings observed, the female was a Golden-wing; the male, a Brewster's (five times), a Blue-wing (once), a Lawrence's (once). In the few mixed nestings that have come to our attention in true Blue-wing territory, the female has been a Blue-wing, the male usually a Lawrence's."

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New York, N. Y.

THE LIFE-HISTORY OF THE PRONG-BILLED BARBET

BY ALEXANDER F. SKUTCH

THE Prong-billed Barbet (*Dicrorhynchus frantzii*) is an odd, attractive, little bird belonging to a family far better represented in the tropics of the Old World than in the New. In Central America, north of Panamá, only two species of barbets are known: the brilliantly colored Salvin's Barbet (*Eubucco bourcieri salvini*), which I have nowhere found common, and the more plainly attired Prong-bill,

abundant only in a wild, mountainous region which, however strongly it may attract the naturalist with its wealth of bright flowers and lovely birds, repels him by its dearth of sunshine and long-continued, frequently violent rainstorms. Neither of these birds of South American affinities reaches as far north as Guatemala.

Perhaps no bird I ever studied gave me more pleasant surprises than this one. The ornithologist, as he advances in his researches, tries to foretell the habits of a new bird by what he knows of its nearest of kin. The accuracy of such predictions is a measure of the thoroughness of his knowledge and depth of insight. They guide his subsequent studies and make them more complete, because he begins with definite questions in mind. But, although I was no longer a novice in the study of tropical American birds when I began to devote attention to the Prong-billed Barbet, most of my conjectures about its habits turned out to be wrong.

APPEARANCE AND HABITAT

My very first meeting with this bird made me aware of some of its baffling characteristics. In November, 1935, I had the opportunity to visit a dairy farm newly carved from the then nearly unbroken forest on the northern slope of the Volcán Irazú in central Costa Rica. The road from Cartago wound up the southern face of the huge, sprawling volcano almost to the rim of the outermost of its many ancient craters. Skirting the summit for a long distance at 11,200 feet, along a nearly level cart-road, we at length began to descend on the northern side, passing at first down long, empty slopes covered only with coarse grass and scattered, low bushes. From this sparse vegetation, we rode down into a zone dominated by bamboos, which in turn gradually merged into open woods of low, gnarled, moss-draped dicotyledonous trees of fantastic aspect. Gradually increasing in stature, the trees soon formed a closed forest in which oaks and the alder (*Alnus acuminata*) predominated. In places the alders grew in an almost pure stand, with magnificent specimens certainly not far from 150 feet in height, with their long, clean, gray trunks supporting open crowns of wide-spreading boughs. At slightly lower elevations, they stood scattered in a lofty forest of more varied composition, with many clustering, tall palms and tree ferns and a profusion of bright-flowered shrubs in the undergrowth. In the midst of this beautiful forest, at an altitude of about 7500 feet, the farm was situated.

The terrain was terribly broken, with towering precipices and bare, rocky cliffs, over which poured many a slender and graceful waterfall.

But between the escarpments were sloping or nearly level terraces of good soil which had been planted with pasture grass. The owner's little cottage looked over a chasm-like valley upon the bare summit of the neighboring volcano, Turrialba. Here I spent a day and a half, and when rain and mist permitted, began to form the acquaintance of the birds of the Costa Rican cloud-forests.

I had never been in a region where birds of all kinds were more uniformly easy to approach. A Hairy Woodpecker (*Dryobates villosus*) allowed me to watch him from only six feet away; and many other birds were almost equally confiding. It was easy to fancy that I had landed upon some mountainous, uninhabited island whose feathered denizens had, as yet, no unhappy experience of man. Along a trail through that lovely, mist-shrouded forest, I came upon three brownish birds, about the size of a Rose-breasted Grosbeak, eating the large berries of some melastomaceous tree, which they held beneath a foot while they tore them apart with their thick bills. Fearlesss as nearly all the birds in this wild district, they contnued unconcernedly to eat their fruits, while I studied them from close at hand.

They were short-tailed birds, and with their big heads and dense plumage appeared unusually stout. Plainly attired, their upper plumage was olive, and their under parts chiefly grayish; but the crown, throat and breast were of a warm golden-brown. The feathers surrounding the base of the bill, on the forehead, lores, orbital region and chin, were black. On the hindneck of the male was a long, narrow, black streak which the female lacked. The short bill was excessively thick and bluish in color, and the eyes were brown. Although I believed that I could place most of the Central American birds in their proper families at sight, I could not imagine what these might be, unless some aberrant, grosbeak-like finch—although finches do not as a rule use their feet for holding food. Had I noticed then that two of the toes on each foot were directed backward, and that the lower mandible terminated in two sharp prongs, in the deep indentation between which fitted the pointed tip of the upper mandible, I would have known at once that my conjecture was far from correct. It was long before I discovered the proper name and classification of these peculiar birds.[1] Even familiarity with the sharp-billed, brightly colored Salvin's Barbet did not help me to place them—rather, it threw me off the track.

In July, 1937, I settled down for a year to study the birds and

[1] These Prong-billed Barbets, at 7500 feet, were at the highest point at which I have seen the species. Carriker (1910) gives their altitudinal range as "about 1,200 feet up to perhaps 6,000 feet." I personally have not seen them below 5500 feet.

plants at Vara Blanca, on the northern slope of the same volcanic Cordillera Central of Costa Rica; but this was farther to the west, between extinct Barba and Poás with its two magnificent crater lakes, the one a seething, sulphureous cauldron of Cyclopean proportions, the other blue and cold as any hemlock-rimmed lake of the northern forests. From my residence at 5500 feet, vast, uninhabited forests stretched to the north and east. The country was broken in the extreme; long, narrow, nearly even-topped ridges were separated by profound gorges, through which rushing streams tumbled with many a lofty cascade. The climate here is one of the wettest in Central America. Blowing in across the Caribbean and the great forested plains of northern Costa Rica and neighboring Nicaragua, violent storms of wind-blown cloud-mist and rain continue for days or even weeks on end, with scarcely a gleam of sunshine. One accustomed to a warmer and sunnier climate soon becomes chilled to the marrow and terribly depressed in the moisture-saturated air, and must, from time to time, glance at the thermometer to reassure himself that the temperature is still a good many degrees above freezing—actually, 5500 feet is still well below the frost-line at ten degrees North Latitude. But when at length the welcome sun rises up into the bluest of skies, lighting up the varied bright colors of the blossoms of a stupendous wealth of orchids and other epiphytic plants that burden all the trees and stumps, rain and mist are soon forgotten in the joy of existing in a land so unimaginably fair. It was in this region of alternate gloom and delight that I studied the nest-life of the Prong-billed Barbet.

HABITS AND VOICE

These were among the most abundant birds in the region. They were exceedingly numerous in the forest, where they usually foraged near the ground, and often ventured forth into the weedy pastures. Here they were almost as tame and fearless as on Irazú, permitting a close approach by man, and frequently scolding with their slight, rattling notes as they watched me intently from the edge of a thicket. In July, their habits of flocking were irregular, for sometimes I would see one alone, sometimes two or several together. Not infrequently one pursued a second, voicing low, harsh notes. Their utterances were, in general, low and unmusical, of a rattling or rasping character. Largely vegetarian, they consumed great quantities of fruits of all sorts. Often I would see them cling beside the heavy fruiting spikes of the epiphytic aroids, to pluck the red or orange berries from the thick, fleshy axis. They also ate the petals of large flowers, plucking

the blossom and holding it against a branch with one foot, while they tore it with their thick bills. Anthophagy is apparently not widespread among birds; the only other flower-eaters I can recall at the moment are the saltators, thick-billed finches of warmer regions.

Floating out of the surrounding forests, at widely scattered hours through the day, I would hear a deep, far-carrying, somewhat throaty call, not unmelodious in the distance, sounding somewhat like the syllables *cwa cwa cwa* rapidly repeated many times over. The call always began as a sudden outburst of sound, in the production of which, to judge from its character, a number of birds joined their voices. For many days I continued to hear this mysterious cry without succeeding in tracing it to its source; but it always conjured up a vision of some fowl certainly no smaller than a quail; and I inclined to the opinion that it was of the gallinaceous order. My surprise was unbounded when the true author of this utterance was revealed to me.

One morning, while I walked along the ever-miry Sarapiquí trail, some birds at the edge of the forest, unseen by me, began to shout in the manner described. Soon a barbet perching in a young Cecropia tree beside the trail, where I had my eyes upon it, joined in the chorus. Presently two of the birds from the forest flew into the same low Cecropia tree, where they faced each other on adjacent branches and called loudly as before. Their greatly out-swollen throats accounted for the production of so loud, far-carrying a sound by so small a bird. Later, in the breeding season, I sometimes watched a mated pair, male and female together, join their voices in this loud call. The voice of the male is distinctly fuller and deeper than that of his consort. These sonorous calls earn for the bird its local name, *cacaleón*—from the Spanish *cacarear,* to cackle—a not particularly pleasing nor appropriate epithet.

SLEEPING

At the end of August, I discovered my first dormitory of the Prong-billed Barbets. Seven individuals slept together in a cavity in a tall, slender, dead trunk at the edge of the forest. The round entrance, shaded by a growth of bromeliads and other epiphytes, was about seventy-five feet above the ground, and so closely resembled the doorway of a woodpecker's hole that at first I took this to be an old, abandoned, woodpecker nest, never dreaming that birds with such short, thick bills as these barbets could carve into wood. Many months passed before I discovered my error. The seven barbets came forth very early in the morning, about the same time as that habitually early riser, the Allied Woodhewer (*Lepidocolaptes affinis*), left its cranny

in a neighboring trunk, and considerably before their ease-loving neighbors, the Costa Rican Woodpecker (*Chloronerpes rubiginosus*) and the Hairy Woodpecker (*Dryobates villosus*) abandoned their snug bedchambers in the adjacent pasture. Emerging one by one, the barbets gathered in the open and sounded their loud, far-carrying call in the dim gray light of the dawn.

The seven barbets continued to sleep in the same hole until at least the middle of October. When next I devoted attention to them, during the second week of December, I found that, before retiring to rest in the evening, the birds flew back and forth between their usual quarters in the tall, slender trunk at the edge of the forest and a big, blasted, but still living tree standing in the pasture, about a hundred feet distant from the first. Some remained to sleep in their old dormitory, while others of the flock found shelter in the big tree in the pasture. The almost unremitting fogginess and rain at this period made it difficult to discover just where in the big tree they slept, or how many retired into each hole. Apparently the barbets were then in a state of indecision as to which of the two dormitories they should occupy.

By the middle of January, the slender, dead trunk where I first found the barbets sleeping had fallen; but continued unfavorable weather delayed my discovery of their new quarters. At last, early in February, I followed them to their latest dormitory, in the big, blasted tree in the pasture. The huge trunk of this tree divided near the ground into two massive forks, one living and the other dead. The dormitory was situated about twenty-five feet above the ground, in the dead fork: but the doorway was so well screened by some leafy boughs springing from the living fork that it was most difficult to see. Watching this hole at dawn on February 8, 1938, I counted five barbets as they came through the doorway, one by one, and flew to the neighboring woods. Then for some minutes no more appeared, and I began to fear that some mishap had befallen two of the seven that had slept in the now fallen trunk. But soon another came through the doorway, and another! and another! and still another! until sixteen had sallied from the cavity! While the first few went directly to the nearby woods, the last to emerge flew off across the pasture, in the opposite direction. Apparently they did not all form a single flock during the day.

That evening I was present to watch the barbets return to their shelter. At 5:40, a lone bird arrived, and continued to go in and out of the hole until, after a number of minutes, a second came up

to keep it company, when both remained in the chamber together. Until six o'clock, or over a period of twenty minutes, the barbets continued to fly singly from the woods across to the isolated tree in the pasture and to enter the hole until sixteen had gone in. Two, as they were about to enter the doorway, had a brief altercation, made evident by low, grating notes, but of no consequence. The hole was not capacious, and I could only conjecture how sixteen birds arranged themselves within it for the night. They must have slept in two or three layers. Sixteen was the largest number of barbets—or of birds of any kind—that I ever found sleeping in the same dormitory.

The little bickerings which, in February, sometimes arose between two barbets as they retired to sleep in the same hole, were an indication that the good comradeship that prevailed in the flocks during the winter months was being supplanted by other feelings. During March, the birds which had been in the habit of sleeping together gradually dispersed. Thus, by March 10, the sixteen in the big, blasted tree in the pasture had dwindled to eight or ten; since they now entered and left when the light was quite dim, it was difficult to count them with accuracy. By March 25, only three individuals slept in this once crowded hole, and after April 2 it was no longer occupied.

There must have been a good deal of restlessness and moving about among the barbets before they all finally settled down in pairs. While some dormitories showed a steady decrease in number of occupants, neighboring ones would at this season enjoy a temporary increase. At the edge of the forest, on the opposite side of the same pasture in which the blasted dormitory tree stood, was a tall dead tree with two holes, whether made by woodpeckers or barbets I am not sure. On March 3, as the light waned, three barbets came to sleep in this tree. One entered the upper hole, then with low, rasping notes repulsed the second who attempted to follow. The barbet that had been refused admittance then went to the entrance of the lower hole, evidently with the intention of entering, but while clinging in front of the doorway was attacked from the rear by the third. The light had now become so dim that it was difficult to follow the birds with the eye; but as well as I could distinguish, two slept in the upper hole while the third vanished into the forest, leaving the lower cavity untenanted. But two evenings later, three barbets, presumably the same, slept together in amity in this tree. On the evening of March 16, three barbets came together and entered the sleeping hole; then, after a considerable interval, three more came and joined the first three in the same cavity. I noticed no dispute save that, after the

first of the early arrivals had entered, one of the remaining two drove at the other with angry sounds and made it flee; but soon both peaceably entered the hole and remained in tranquility. On the evening of April 6, four birds entered this hole without friction. After this, the old dormitories remained deserted.

In March, the barbets began to grow more vocal. I often heard their deep, full-voiced calls, joined in by a number of birds that answered back and forth in the woods, or from bushes and trees scattered through the clearings. By the second half of the month, the mated pairs had begun to prepare their nests.

THE NEST

The bird-watcher at length learns from his repeated false inferences that it is hazardous to predict the form of a bird's nest from the structure of the instrument that fashions it. Not every bill is as obviously adapted to its several functions as the woodpecker's chisel. Who would suppose that the long, slender bill of the jacamar is used as a pick for digging a burrow in the earth; or that the seed-eater's short, thick bill serves to construct, of thread-like rootlets and cobweb, a little cup of filagree delicacy? For many months I had tacitly assumed that the barbets, like the araçari toucans (*Pteroglossus* spp.), slept in old woodpecker holes; for I did not believe that their short, swollen bills would serve for carving into wood. But at the beginning of the nesting season I discovered my error.

The Prong-billed Barbets carved out their nest-cavities themselves, in wood softened by decay but still firm and solid, in dead trees or dead branches of living trees. I saw none of their nests in wood so far advanced in decay that it had begun to crumble. The six occupied nests which I found ranged in height from eleven to over sixty feet. In general, such sites were chosen as would have appealed to woodpeckers, with the difference that the barbets sometimes placed their nests in such a position that the entrance was screened by leafy shoots or epiphytic growths, while woodpeckers nearly always prefer an exposed situation in a clean, leafless trunk, where they enjoy a wide outlook from their doorway. With a single exception, all the nests I discovered were in the clearings and pastures, but never far distant from the forest which covered most of the region. Four were in pastures and one beside the trail, in a low post which upheld the single telegraph line that ran down to El Muelle de Sarapiquí. This was the lowest of all, only eleven feet up. Although I found only a single nest in the forest, it is probable that more careful search

would have revealed a great many more. Most of the forest birds whose nesting I particularly wanted to study—Quetzals, Blue-throated Toucanets, Allied Woodhewers and these barbets—took advantage of the dead trees standing in the pastures as sites for their nests; and I soon found so many in the clearings that I had little time or necessity to hunt in the woodland for more.

The barbets began to carve out their nest cavities in late March or early April. They worked principally very early in the morning and late in the afternoon—at least, at these times of day I was most successful in watching them. Male and female shared the labor, whether equally or not I could not determine, for the nests where I watched them carving into the wood chanced to be so high that I experienced difficulty in distinguishing the sexes. While one of the pair was at work, the mate perched close by, often stretching a brownish wing as though bored with waiting. I never saw one working alone, as woodpeckers so frequently do. In their reluctance to labor at nest-building in the absence of the mate, barbets agree with trogons, jacamars, kingfishers, puffbirds, motmots, and parrots, all of which nest in holes or burrows constructed by themselves.

The most difficult part of the task of nest-carving was apparently making a start, when the barbets were obliged to cling to the side of the trunk in a posture far less natural to them than to woodpeckers. The carving, so far as I could see, was accomplished chiefly by biting away the wood rather than by chiseling—a procedure for which their short, swollen bills are hardly adapted. Yet sometimes I distinctly heard a tapping sound emanate from the hole in which a bird was at work. It might be imagined that the delicate prongs at the ends of their mandibles would be broken by applying them to such uses, but this apparently is not true. The wood into which they carve, although still in those early stages of decay when it is neither discolored nor crumbling, is so soft that a man might dig into it with his fingernails. While woodpeckers often choose harder wood, they sometimes make their nests in trunks far more thoroughly decayed.

The barbets worked in short shifts. Eight minutes was the longest interval that one remained continuously in the unfinished nest, presumably working, while I watched them. More often they stayed in the nest only a few minutes at a time. At the beginning, they left the cavity tail-first; but after it grew wide enough to permit them to turn, they made their exit head-first. Emerging, the barbet brought out a billful of loosened particles, which it took to a perch close to its waiting mate, or often carried out of sight among the trees, before

letting them drop. Frequently a bird would go into the nest apparently for no other purpose than to carry away a billful of wood chips. Of the many hole-nesting birds I have watched dig out their nest-cavities, barbets are unique in carrying off the loosened debris; but Odum (1941) found that Black-capped Chickadees, when excavating their chamber, take the chips a short distance away, and Coward (1928) states that the British Willow-Titmouse does the same, although not consistently. The form of the barbet's bill allows it to carry away a larger load than a woodpecker could do.

One nest which I watched the barbets excavate required no less than eight days for its completion. As soon as the cavity was big enough to accommodate them, male and female slept together in it, deserting the crowded dormitories in which they had hitherto passed their nights. Now they emerged considerably later in the morning than they were in the habit of doing while they slept in larger companies. While one looked out through the doorway upon awaking, the other might linger in the bottom, putting the finishing touches on the woodwork of their new bedroom; for I sometimes heard tapping, as of a woodpecker, coming from the nest before the morning departure of its inmates.

Viewed from the ground, it is difficult or impossible to distinguish the doorway of a barbet's nest from that of a small woodpecker—a *Centurus, Chloronerpes* or *Tripsurus,* for example. But at the first glimpse of the interior, one familiar with woodpecker holes notices obvious differences. The doorway of a woodpecker's nest has little thickness, for the bird begins to carve downward as soon as it has penetrated the outer shell, while the barbet continues to dig more deeply into the wood before turning downward, making an entranceway like a short, horizontal tube, two or three inches long. The difference between the woodpecker's and the barbet's entranceways corresponds to that between the doorway of a thin-walled, modern, human dwelling and that of some ancient stone building with walls several feet thick. Once through the doorway, which is about 1⅞ inches in diameter, and well into the heart of the trunk, the barbet turns abruptly downward, leaving very little space in the top of its nest behind the aperture; while the top of a woodpecker's nest has a far more capacious vestibule. The difference is quite obvious to one who is in the habit of examining such nests with a mirror and electric bulb pushed through the entranceway; barbets' nests are much less convenient to look into than woodpeckers'. For the rest, woodpeckers' and barbets' holes are similar in shape, both being deep and rela-

tively narrow, rounded on the sides and bottom. The rotundity of some of the barbets' nests was broken by ridges of wood projecting irregularly into the interior, doubtless too hard for the birds to remove with their less perfect carving tools; but others, in wood of more uniform consistency, were as neatly rounded as the best woodpeckers' work. The cavity in which the sixteen barbets had slept differed from all the others I examined in being much wider than deep, flat on the bottom, with very irregular, instead of rounded, sides. Its peculiar shape was apparently determined by the configuration of the softer portions of this still slightly decayed stub. While I had not seen the barbets carve out this cavity, it was obviously a 'made' hole; and it is far more likely that barbets were responsible for it than that it had been carved by woodpeckers.

EGGS AND INCUBATION

Soon after the pair began to sleep in the newly completed hole, the female started laying the eggs. The earliest egg of which I have record appeared on April 9. Thereafter, one was laid daily in this nest until there were five. Two other accessible nests contained four eggs each. The eggs were pure white and glossy, resembling those of woodpeckers. Since to open a nest of this type with saw and chisel decreases its chances of success, no matter how much care is devoted to closing it off again, I did not remove the eggs for measurement. They lay upon a bed of chips at the bottom; no softer material had been taken in as a lining.

At the nest to which I devoted most attention during this period, incubation began with the laying of the fourth of the five eggs. Male and female continued to sleep together in the nest cavity during the laying period, the incubation period, while there were nestlings, and even after these departed. Such an arrangement, although rare among birds, is by no means unknown in other species of which both sexes incubate. Male and female Golden-naped Woodpeckers (*Tripsurus chrysauchen*) and piculets (*Picumnus olivaceus* and other species) sleep together in the breeding nest, as at all times of the year (Skutch, 1943). Male and female Blue-throated Motmots (*Aspatha gularis*) do likewise in their burrows at all seasons. Male and female Black-eared Bush-tits (*Psaltriparus melanotis*) sleep with their eggs in their downy pouch (Skutch, 1935); the male Long-tailed Titmouse (*Aegithalus caudatus*) of the British Isles takes shelter with his mate and the eggs in the beautiful oval nest (Coward, 1928); and sometimes the male Gray-crowned Wood Wren (*Henicorhina leucophrys*) and the

male Banded Cactus Wren (*Heleodytes zonatus*) sleep with their mates while they incubate (Skutch, 1940). The male Blue-and-White Swallow (*Pygochelidon cyanoleuca*) slumbers beside the nest where his mate incubates, in a burrow, or cavity in a tree, or in a cranny beneath the roof. The Barn Swallow, at least sometimes, has the same habit of sleeping beside the nest in which his mate incubates. Both sexes of the White-rumped Swift (*Micropus caffer streubelii*) of Tanganyika Territory spend the night in the closed, mud-walled nests they have inherited from the swallow, *Hirundo abyssinicus* (Moreau, 1942). Although this appears to be a longish list of male birds which sleep in the breeding nest with their mates, I have for years devoted attention to this phase of nest-life, and in only a very small proportion of the species studied have I found both birds in the nest during the night.

Upon awaking at dawn, the barbets would sometimes utter low, rattling notes within their chamber. Soon one would take possession of the doorway and linger a short while—at times as long as eight or nine minutes—looking forth upon the growing daylight. Then it would emerge and fly away. The other might follow at once, or delay for a few minutes more. The eggs were then left unattended for a brief period while the pair sought breakfast. Then, from seven to sixteen minutes after the departure of the last, one would return to resume incubation. On the single morning when I succeeded in identifying the bird returning at this time, it was the female. Although the long black stripe on the back of the male's head distinguished him clearly from the female, in practice it was not easy to recognize the sexes at nests well above the level of the eye.

During the early hours of morning, the barbets were impatient at their task of incubation. The call of their kind coming from the neighboring forest would draw the bird from its nest, even if it had been sitting only a few minutes. Sometimes, after a very brief period on the eggs, the barbet would come forth, perch on a convenient branch beside the doorway to look about, then go back into the nest again. Or it would call until it received an answer, and fly off in the direction of the sound. Thus the eggs would be left uncovered for brief periods, but rarely for long, for one or the other of the pair would soon return to take a spell on them. When one of the pair stayed on duty until its consort arrived to replace it, the newcomer would cling beside the doorway until the mate made way for it. As nest-relief was effected, the birds would utter low, rattling notes. As the morning grew older and the drowsy hours of the day approached,

the barbets became reconciled to longer hours at their lonely and doubtless slightly boring task, and would sit for an hour to nearly two hours at a stretch. Sometimes, while incubating, the male barbet relieved his ennui by tearing or hammering at the wall of the chamber, thereby continuing to enlarge it.

Perhaps better than generalities will be the actual schedule I made on the morning of April 17, at a nest in which incubation had been in progress during five days. I began my watch at 5:20 A. M., as day broke. At 5:25, I heard low, rattling notes from the nest. Two minutes later, one of the pair began to look through the doorway, where it lingered until it flew forth at 5:36. The mate delayed inside for six minutes more, departing at 5:42. Sixteen minutes later, one of the pair returned to incubate. Beginning with 5:42 A. M., their sessions and absences, during nearly seven hours (until 12:28 P. M.) are given in the following table. If the figures are read from left to right, as the text of a book, the actual sequence of events can be followed:

Nest attended by			*Nest unattended*
Male	*?*	*Female*	
			16 minutes
	15 minutes		2
	14		3
24			13
		32	
12			30
		26	
81			12
15			1
		110	
Totals: 132	29	168 = 329	77

The male covered the eggs a total of at least 132 minutes; the female, 168 minutes; while 29 minutes were accounted for by members of the pair not recognized as they entered. The total time devoted to incubation by the two together was 329 minutes, as against 77 during which the nest was unattended. Thus the eggs were left uncovered slightly less than one-fifth of the time. While, as a rule, when both sexes incubate, as with woodpeckers, trogons, kingfishers, motmots, antbirds, etc., the eggs are kept more constantly covered, other kinds of birds, notably toucans, are less patient sitters, and male and female together fail by a great deal to keep the nest constantly attended.

At this period, the mated pair of barbets gave many tokens of mutual affection. Once I saw a male feed his mate. Perching close together, they would bill each other's feathers and frequently they joined their voices in their loud, throaty cries, when it was evident that the female's tones were weaker than her mate's, and somewhat hoarse in quality.

Although so gregarious during most of the year, now in the breeding season the barbets had become strongly 'territorial,' and repulsed every trespasser of their kind that ventured near their nest, flying at it with harsh rattles and rasping scolds. Rarely two birds would clinch and fall to the ground; but on the one occasion when I witnessed such an encounter, neither contestant seemed to come off the worse for the scuffle. Birds of other kinds were also driven from close proximity to the nest. A female Hairy Woodpecker, which had been sleeping in a hole in the same small tree in which a pair of barbets nested, abandoned her quarters at about the time these began to lay, possibly having been driven away by them.

On the morning that I watched the pair incubate, the female barbet chanced to alight close beside a fairly large gray lizard that clung head downward on a hanging branch. The reptile immediately, and apparently as a warning, extended its pale pink gular pouch, which, projecting toward the barbet, almost came into contact with her. She lightly touched it with her bill, but did not seem alarmed nor move away at once although the lizard was bigger than herself. This mutual confidence and toleration between two very dissimilar creatures was most pleasing to witness.

But the barbets were fearless of most creatures, great or small. At their nests, as well as while foraging through the woods and bushy fields, they showed the utmost confidence in the good intentions of man. Even at low nests, it required a great deal of hammering and shaking of the trunk to make the bird in charge come forth when I wished to examine the contents. A few slight taps would cause it to look out to see what was happening below; but it was rarely in a hurry to depart. Often it would watch while, with an assistant, I set the heavy 23-foot ladder against the trunk, and reluctantly depart only when I had climbed to within a yard or two of the doorway. And often one would return to the eggs before we had time to remove the ladder. Even at the eleven-foot-high nest in the telegraph pole, the barbets would enter while several people stood about it. One even tried to go in before I had removed the electric bulb that illuminated the interior, but desisted upon striking against the cord

that passed through the doorway. With this, as with the great majority of birds whose nest-life I studied at Vara Blanca, I was not obliged to conceal myself in a blind—a most fortunate circumstance since the climate was so wet and sitting for long periods in a confined space enclosed by wet cloth is neither comfortable nor healthful.

THE YOUNG AND THEIR CARE

On the afternoon of April 26, as I climbed up toward the barbets' nest that at this period chiefly engaged my attention, I heard weak, subdued cries, as of nestlings, emerging from it. But when I inserted the electric bulb and mirror and looked in, I beheld only the unbroken white surfaces of the five eggs. The little barbets were crying within their shells as they strove to escape them. The parent in charge of the nest when I arrived became more excited than I had ever before seen either of the pair. He flew back and forth between the ends of the two stubs of branches which were all that remained on the dead tree, a yard or two above me, and uttered loud, cackling cries such as I had not hitherto heard. These soon drew his mate, who shared his distress.

The following afternoon, when I again visited the nest, I heard, while climbing the ladder, cries of the same character as had issued from the hole on the preceding day, but now far louder and of a somewhat strident, squeaky nature. Hastening to illuminate the interior of the cavity and to push in the little mirror, I beheld my first barbet nestlings—perhaps the first nestlings of the Prong-billed Barbet that any naturalist had ever seen. There were five of them, pink-skinned and utterly devoid of down, huddled in a compact mass in the center of the floor. Their eyes were tightly closed; and the lower mandibles of their short bills were both longer and broader than the upper mandibles, as in newly hatched woodpeckers, toucans, and kingfishers. Their egg-teeth were less prominent than those of woodpeckers. Their heel-pads were large and conspicuous, and covered with long, sharp papillae. The fleshy caudal protuberance was longer and more prominent than in most nestlings, and was used as a third point of support by the little barbets as they stood upon the wood particles that carpeted their wooden nursery floor. The shells, save a single remaining fragment, had already been removed from the nest by the parents, which flew back and forth close above me and voiced the same loud, sharp cries of distress that I had first heard on the preceding day. I had hardly descended to the ground before one returned into the nest.

The eggs had hatched in the surprisingly short period of thirteen days, counting from the date on which the last was laid, and all within the space of twenty-four hours, despite the fact that both parents had slept in the enclosed nest with them during the period of laying. Moreau and Moreau (1940) give fourteen to fifteen days as the incubation period of the African barbet, *Tricholaema leucomelan*. I am not aware of any other determinations of incubation periods in this family.

One of the nestlings vanished within three days of hatching, and another on the following day, leaving only three survivors. Apparently, as so frequently happens with woodpeckers, the weakest of the newly hatched nestlings lost out in the competition with the strongest for food and died of starvation; but possibly the prevailing bad weather may have had much to do with their death. The survivors always stood in the center of the floor with their naked bodies pressed together and their slender necks intertwined, and from time to time gave voice to sharp little cries of hunger.

During the first days, the parents brought them tiny insects, some with wings, and other objects too small for recognition while held in their thick bills. If they arrived with food while I was at the nest, they hopped about close above me and entered as soon as I had descended the ladder a few feet. Fruit became an increasingly important constituent in the nestlings' diet; and when over a week old they were nourished almost entirely upon fruit while insects were very rarely brought. Whole small berries were sometimes given the nestlings, but the red pulp of some larger, unidentified fruit was brought in great quantities. Once the male entered the nest with the green drupe of the ira rosa (*Ocotea pentagona*), a lauraceous tree whose hard fruits are a favorite food of the Quetzal. But this was obviously more of a mouthful than the little barbets could swallow, and after a minute or two their father reappeared in the doorway and, with some difficulty, gulped it down himself. The two parents took virtually equal shares in feeding and brooding the nestlings.

The interior of the nest-chamber was kept scrupulously clean. The parents removed the droppings mixed with the wood fragments that covered the bottom of the nest, and on departing would, as a rule, carry away a large billful of this mixture, always lettings it fall at a distance from the hole. By the time the nestlings were four or five days old, all of the original litter of fragments had been removed from the bottom of the chamber; yet the parents continued to bring out large billfuls of such material. I could account for this only by the

assumption that they continued to dig into the sides or bottom of the cavity and loosen fresh chips; yet it was impossible to obtain direct confirmation of this view.

Both parents continued to sleep in the nest, as before the eggs hatched. Yet by day the two were never seen in the nest together. Upon arriving with food for the nestlings, the parent flew direct to the doorway, whether or not the mate happened to be brooding within, as it usually was during the nestlings' first days. If the nest was occupied, the new arrival, advised by sounds that the other was within or else prevented from entering by its prompt appearance in the top of the chamber, flew back to the nearest convenient perch to allow its mate to come forth, then promptly entered to feed the nestlings. Golden-naped Woodpeckers, piculets, and White-rumped Swifts (see Moreau, 1942) all of which, like barbets, sleep together in the nest, are often within together for brief intervals by day, while incubating or attending the young; but woodpeckers, which sleep singly, are scarcely ever found in the nest together.

On the afternoon of May 6, a torrential rain, blown by a hard south wind, was driven into the southward-facing doorway of this hole in such quantities that the water-tight bottom was flooded and the nestlings drowned. At the age of nine days, the pin-feathers of the little barbets were just beginning to be visible beneath the transparent skin, and the eyes were still tightly closed. Their development had been very slow, and doubtless they would have remained in the nest at very least a month. Moreau and Moreau give the fledging period of *Tricholaema leucomelan* as five weeks, and add that *Buccanodon o. olivaceum,* another African barbet, is in the nest for more than thirty days.

With the loss of this and all the other accessible nests I had found, I was unable to study in detail the later stages in the development of the nestlings, or to determine the length of their sojourn in the nursery. But on June 12, I found a nest only twenty feet above the ground, in a massive, epiphyte-burdened stump in a pasture, excellently situated for watching. There was no need to bring the ladder to see what it contained, for the well-feathered nestlings showed their heads in the doorway, and to approach them too closely might have caused their premature departure.

Although these young barbets spent most of the day looking, by turns, through the doorway, the parents, upon arriving with food, almost invariably pushed inside to feed them. Only once did I see a parent pass food to a nestling while clinging outside, as so many

hole-nesting birds do under these circumstances. Small, soft fruits and fruit pulp formed the great bulk of these nestlings' nourishment. Hard fruits, such as were preferred by the Blue-throated Toucanets and Quetzals nesting in the neighborhood, were rarely brought by the barbets. They would arrive at the nest with their thick bills full to capacity with soft fruit pulp, and apparently still more in their throats. The nestlings were fed very frequently, and the amount of fruit they now consumed was prodigious. Rarely they received an insect.

The parents continued to devote much attention to cleaning the nest, carrying away great billfuls of wood particles with which the droppings were mixed. Much of this debris still looked bright and fresh, as though newly separated from the solid wood. Its appearance, and the amount that was daily removed, left little room for doubt that this was so, and strengthened my earlier assumption that the parent barbets dug into the sides or bottom of the nest to make fresh particles, possibly at the very time they cleaned the nest. The parents were most active in removing waste material between six o'clock and a quarter past six in the evening, when they carried away many billfuls in rapid succession. After this quarter-hour devoted to preparing the nest for the night, both parents disappeared for an equal period, during which they doubtless got their own supper. Then, at half-past six, both entered to sleep with their well-fed nestlings.

THE FLEDGLINGS; RETURN TO THE NEST

This low nest was the latest of all I found. The two young birds flew from it before nine o'clock on the morning of June 16. At this hour, I found them in a clump of epiphyte-laden trees fifty feet in front of the nest, where the parents were feeding them. The fledglings bore a fairly close resemblance to the adults, but there were certain evident differences. The foreheads and fore-necks of the young birds were not quite so bright a golden-brown. Their bills, instead of being bluish like those of the adults, were horn-color, with a suffusion of black that was most dense in the middle of the upper mandible. Their eyes were framed by conspicuous rings of bare, pale yellowish skin, giving them a facial expression quite distinct from that of the old birds which lacked such orbital rings. Neither of these two fledglings bore on its hind-neck the tuft of black feathers that distinguishes the male, but had a little, round, gray spot on the occiput, that both parents lacked. They were evidently both females; for about this time I saw another young barbet, still fed by

his parents, that wore a black stripe on its hind-neck, very much like that of the adult male. Thus the young in juvenal plumage resemble the parents of the same sex; the sexual differences are, as with woodpeckers, evident at an early age.

From what I knew of other birds with similar sleeping habits, I felt confident that the young Prong-billed Barbets would be led back to sleep in the nest with their parents. Accordingly, I was present late in the afternoon of the day of their departure to witness the event. Although rain began to fall at four o'clock—there had been a very hard shower at noon—the family did not appear in the vicinity of the nest until 4:55. Then one of the parents went into the nest, but promptly came out and flew to the clump of trees fifty feet in front. The two young barbets then came and clung to the top of the trunk in which they had been hatched, but not finding the doorway of the nest, they likewise went to the clump. They could already fly considerable distances, fifty feet or more, without a rest; but their flight was slow and poorly controlled.

For the next hour, the parents continued to go in and out of the nest, just as Costa Rican House Wrens and Banded Cactus Wrens do when they guide their newly emerged fledglings back to shelter for the night. Sometimes upon leaving the hole they flew only as far as a young Cecropia tree that stood close by, upon whose yard-long petioles they perched; but more often they winged back to the clump of trees where the youngsters rested. During this period, the fledglings made little effort to reach the nest. Once, indeed, one went to the dead trunk, but without finding the doorway. Then it started back to rejoin the family in the clump, but on the way grew tired and dropped to the close-cropped grass beside me. It was wholly devoid of fear. After a short rest on the ground, it rose to perch on a low branch of a lovely Cavendishia bush growing on the trunk of one of the trees in the clump. Here she allowed me to touch her, even her bill, without attempting to move away, merely regarding me with curiosity like a new-born calf. The youngsters were fed scarcely any after their arrival in the vicinity of the nest; they did not appear to be hungry.

At first, but a single parent went into the nest at a time, and came out before the other entered; but as night drew near both stayed in together. At about six o'clock, one of the fledglings—both had hitherto been quite silent—called *cwa cwa cwa,* much as the parents call, but in a weaker voice. Upon hearing this, both parents left the nest and returned to their fledglings, now perching close together in the

top of a tree. Then the adults flew back to the hole; and the young birds followed, one close behind them and the other after a few seconds, as for the last hour the parents had been trying by example to persuade them to do. The parents entered the nest while the youngsters came to rest upon petioles of the great-leafed Cecropia tree. After a brief pause here, one of the young barbets reached the doorway of the nest and entered without much difficulty. The parent, which was looking forth at the moment, thoughtfully drew back into the interior at its approach to leave the passage free. Then the second parent, which meanwhile had emerged again, returned into the nest for the night.

But the second fledgling, although it flew to the trunk, did not so easily reach the doorway of the nest. Clinging to the trunk, it gradually slipped to the ground. It wandered beneath the dead trunk, which was held up on charred prop-roots, and upon coming forth seemed completely bewildered, for it flew farther off into the pasture and came down upon the grass. Again taking wing, it wandered still farther from the nest. Following, I caught it, then stood in front of the nest with the little bird upon my open hand. Here it rested quietly for a quarter of an hour, in the rain. When at last it took flight, it was not toward the nest, but away from it. Alighting in a tree down the slope, it flitted from bough to bough until I lost sight of it amidst the foliage and the gloom, for the daylight was waning fast. Here the little barbet passed that wet night. As soon as they had one fledgling in the nest with them, the parents remained quietly within, to all appearances forgetful of the other in the open. Yet they had retired twenty-five minutes earlier than on the preceding evening, before the departure of the nestlings.

The following morning at dawn, I resumed my watch of this nest. The first parent came forth at 5:37, the second a minute later. For over two hours they remained out of sight, quite neglecting the youngster that had slept with them, but no doubt stuffing the other that had passed the night amongst the foliage. Thus it received its recompense. As the morning wore on, the little barbet in the hole looked forth more and more, until at length, seeing that its parents had returned to the trees in front, it flew out to them and at last began to receive some breakfast. Among other things, it was given pieces of the green fruiting spikes of the Cecropia.

That evening, both fledglings succeeded in entering the nest; the more backward of the two was not obliged to pass more than a single night in the open. I had not been there to watch them enter—the

toucanets had claimed my attention that evening—but the following morning I was present to witness their departure. They now came out much earlier. The parents, after one of them had delayed many minutes gazing through the doorway upon the wet landscape, emerged at 5:46. Since now they had both youngsters inside, they started to bring food to the nest. At 6:10, one returned with a morsel and alighted in the Cecropia tree. Immediately upon its arrival, the fledgling that had been looking through the entrance came out to receive the food. The other followed three minutes later; and the whole family moved off through the tree-tops where I could not follow.

At the end of the fledglings' third day in the open, the family returned to the vicinity of the nest at a quarter to six. The male at once went to the hole to remove an overflowing billful of wood particles that appeared quite bright and fresh. Then all four rested quietly in the top of a tree for the next quarter of an hour. They did not eat, but appeared full and contented. After a while, another heaping billful of wood particles was carried from the nest by one of the parents. Thus attention to the cleanliness of the hole did not cease with the departure of the nestlings. Then one of the youngsters flew to the Cecropia tree beside the nest. It took the torn edge of a leaf in its bill, but found that it was not good to eat—its instinct to feed itself had developed ahead of its discrimination of what was edible. Soon after six o'clock, both young barbets followed the parents into the dormitory without difficulty.

The fifth morning after the young barbets' graduation from the nest was wet and blustery; and they lingered in the shelter of the dormitory about three quarters of an hour after the departure of their parents. They were neglected until after the first of the youngsters had come into the open, by which time the parents returned and began to give them a breakfast of Cecropia fruits. But by July 5, three weeks after the young barbets had begun to fly, the whole family departed from the dormitory at about the same time; while in the evening young and old went to rest in no set order. By the end of the month, the hole in which the family had been raised remained quite deserted. I could not discover what had become of the four barbets.

Early in August, I discovered a single barbet sleeping in a hole, sixty feet above the ground, in which a pair of Boquete Woodpeckers (*Dryobates villosus extimus*) had raised a brood earlier in the year. This was my first unequivocal evidence that the barbets may, at times, make use of woodpecker holes for sleeping. This woodpecker hole

was not far distant from the cavity in which the four barbets had slept; and it seemed not improbable that the lone barbet that now occupied it was the single survivor of some nocturnal tragedy that had befallen its family. Thus, from the six nests I had found, five of which certainly had held eggs, only two young were fledged, and possibly only one, or none at all, grew to maturity. This is an exceptionally high mortality for a hole-nesting bird; and I feel confident that a statistically significant number of nests would show a higher degree of success. I found no evidence of a second brood.

ENEMIES

One day, I saw a White-throated Falcon (*Falco albigularis*) carry off a full-grown Prong-billed Barbet. This fierce little hawk is—aside from man—the one living enemy of the adult barbet that I discovered during a year's residence in its range. Another formidable enemy is the long-continued rainstorm so frequent in the region, which at times saturates the plumage of the birds until they can no longer fly. During a spell of bad weather in December, some children found one in this pitiful condition; but after a few days in a dry place, with an abundance of berries as food, it recovered and flew away.

In the highlands where the Prong-billed Barbet dwells, one of the most relentless enemies of nesting birds is the Blue-throated Toucanet (*Aulacorhynchus cæruleigularis*), which preys insatiably upon eggs and nestlings, even as its far larger relative, Swainson's Toucan, in the forested regions of the lowlands. Both of these species are, in my experience, far more addicted to nest-robbery than the araçari toucans (*Pteroglossus* spp.), which are intermediate between them in size. At Vara Blanca, a pair of the toucanets took possession of a nest-hole newly made by a pair of Hairy Woodpeckers and, slightly enlarging the doorway, laid their own eggs therein. The boy who helped me in my work and was thoroughly familiar with the birds concerned, told me one day that he had seen a pair of *currés*, as the toucanets are called, tearing at the entrance of a barbets' nest in which eggs had recently been laid, while the owners flitted about and protested. But in this instance the toucanets were less successful in their attempt to force an entry than they had been in the case of the woodpeckers' nest. For the barbets' nest, as already mentioned, is carved more deeply into the trunk than woodpecker nests; the wood surrounding the portal, two or three inches thick and quite firm, completely baffled the efforts of the toucanets to enlarge the orifice with their clumsy carving tools. None of the six barbets' nests that I kept under ob-

servation was occupied by toucanets; and I do not believe that these thieves were responsible for the losses which most of the pairs suffered.

May it not be that the barbets' habit of placing their holes so deeply in the wood was developed as a defense against the toucanets? These barbets apparently originated in the same region as the toucanets, and hence it is likely that their habits have been modified by the presence of so formidable a predator. But the breeding woodpeckers of the region (*Dryobates villosus extimus, Balanosphyra formicivora striatipectus* and *Chloronerpes rubiginosus uropygialis*) belong to far-reaching species that in all probability originated in other regions, and hence would be less likely to have developed a special defense against an enemy whose habitat they subsequently invaded as they extended their range.

Of the nests that were lost, one at a great height had been torn open, apparently by a tayra (*Tayra barbara*) or some other powerful arboreal mammal; one appeared to have been entered by a rat or a weasel; one was destroyed by human agency; and in one, as already mentioned, the nestlings were drowned.

COMPARISON WITH OTHER SPECIES

The only other Costa Rican barbet, and the only other member of the family Capitonidae I know at first hand, is Salvin's Barbet (*Eubucco bourcieri salvini*). This bird is so different in every respect from the Prong-billed Barbet that, without the presence of intermediate forms, it is difficult to believe that they can be, in fact, members of the same family. The plumage of Salvin's Barbet—brilliant red head set off by a white nuchal stripe, green upper plumage, red throat and chest fading to orange and yellow on the lower breast and sides—contrasts as sharply with the Prong-bill's subdued colors as its sharp yellow beak does with the latter's blunt, swollen bill. In habits, the two species differ no less than in appearance. While the Prong-bill is highly sociable, I have found the other solitary, both in Costa Rica, where it is widespread but apparently nowhere common, and in Ecuador, where it is more abundant. Except in the breeding season, it is always quite alone and repulses all others of its kind. The Prong-bill is largely vegetarian; but Salvin's Barbet is insectivorous, spending its time well up among the forest trees, where it investigates curled or rolled dead leaves, either probing the interior with its sharply pointed bill, or else biting them on the outside, to force from its retreat any small creature that might be lurking within. In contrast to the somewhat garrulous Prong-bill, Salvin's

Barbet is habitually silent; and I have never succeeded in identifying its call, if it has one. So far as I am aware, its breeding habits are quite unknown.

The habits of the numerous kinds of barbets of British India are fairly well known. The species treated by Hume (1890), nine in number, all nest in cavities in trees, apparently excavated by themselves. In the case of the Blue-faced Barbet (*Cyanops asiatica*), a pad of softer material was found in the bottom of two nests; but it was not certain that this had been taken in by the barbets themselves. The Ceylon Green Barbet (*C. zeylonica*) is said to collect a few grass stalks for the eggs to lie on; but this accumulation is "scarcely worthy of the name of nest." Otherwise, the nests described by Hume contain no lining beyond the accumulation of wood particles in the bottom. The Small Green Barbets (*C. viridis*) do not always make a fresh nest cavity each year, but sometimes reoccupy the hole used the preceding year. The Crimson-breasted Barbet (*Xantholaema haemacephala*) uses the same hole year after year but generally lengthens it each season, so that finally the cavity may reach four or five feet in length. When it becomes very long, the birds open another entrance nearer the end where the eggs are laid. These barbets may carve their nests in horizontal branches or beams, with the doorway on the lower side. In some species, at least, the holes are used also as dormitories. Thus the Small Green Barbets "usually occupy these holes to roost in the whole year round."

The beginnings of colonial nesting may be seen in some of these Indian barbets. Five nests of the Small Green Barbet were found in one stump twenty feet high; but it is not clear how many were actually in use at the time. Three holes of the Crimson-breasted Barbet were found in the same branch of an old dead tree, one above the other, and about one foot apart. The lower contained chicks; the middle was used by another pair of birds "which doubtless would have laid in a day or two" if they had not been disturbed; while the uppermost was not in use. Of a West African genus of barbets, *Gymnobucco*, Friedmann (1935) states that a dozen or even two dozen pairs may have their nest-holes in the same tree, while neighboring trees are wholly devoid of holes. The Prong-billed Barbet, while decidedly gregarious during most of the year, becomes strongly intolerant of the presence of other pairs while it is nesting. It has not progressed so far in the development of social life as some of the Old World barbets, yet it is well in advance of its solitary neighbor, Salvin's Barbet.

SUMMARY

1. The Prong-billed Barbet (*Dicrorhynchus frantzii*) is widespread on the outer (northern and eastern) slopes of the Cordillera Central of Costa Rica, ranging from at least 1200 to 7500 feet above sea-level; between 5000 and 6000 feet it is one of the abundant birds. It inhabits the cloud forest and small clearings with scattered trees and bushes in an excessively humid region subject to much fogginess and long-continued rainstorms.

2. It is largely vegetarian, consuming fruits and berries of many kinds and the petals of flowers. It holds food beneath a foot to tear it apart.

3. During the non-breeding season, the barbets are found in small, irregular flocks, or sometimes singly.

4. The most commonly uttered notes are low and unmusical, of a rattling or rasping character; but several individuals may join in uttering loud, far-carrying, somewhat throaty calls of a volume surprising for so small a bird. The voice of the female is similar to that of the male, but not so full and powerful.

5. At night the birds sleep in dormitories resembling woodpecker holes. Sixteen was the largest number found in one hole. They retire late and arise early.

6. In March, as the breeding season approached, there was much shifting about of the birds among the available dormitories. While at some holes the number of inmates decreased, at others there was a temporary increase. At this period, there was growing antagonism among the several individuals that slept, or wished to sleep, in the same dormitory. By early April, when the paired barbets began to sleep in their new nesting holes, the old dormitories remained deserted.

7. The nest-chamber is carved in the dead, but fairly sound, wood of trunks and branches. Both externally and internally it resembles the hole of a small woodpecker. The chief difference is the thicker wall around the doorway of the barbets' nest.

8. The hole is excavated by both sexes, working alternately. Each labors only in the presence of the other. The birds work for short spells—usually less than eight minutes. The loosened wood particles are always carried out in the bill and dropped at a distance from the nest. At least eight days were required for the completion of one nest. The cavity is not lined, but the eggs rest upon the wood particles on the bottom.

9. As soon as the hole is large enough, male and female sleep in it,

continuing to do so through the whole period of egg-laying, incubation, raising the nestlings, and even after these have departed.

10. The barbets are now 'territorial,' repulsing trespassers of their own kind. Only one fight was witnessed.

11. The earliest egg recorded was laid on April 9. An egg appears daily until the set of four or five is complete. The eggs are pure white and glossy, resembling those of woodpeckers.

12. Male and female share almost equally the task of diurnal incubation. During the early morning they are very restless, shifting about frequently. Later in the day, they may sit continuously for an hour to nearly two hours.

13. The eggs in one nest hatched thirteen days after the last was laid, and all within twenty-four hours.

14. The newly hatched nestlings are pink-skinned, utterly naked, blind, with prognathous lower mandible and prominently papillate heel pads.

15. The parents share the work of brooding and feeding the nestlings.

16. The newly hatched nestlings are nourished chiefly with small insects; but as they grow older, fruit rapidly gains in importance in their diet. Older nestlings are given enormous quantities of fruit, both whole berries and the pulp of larger fruits. Soft fruits are preferred.

17. The nest is kept scrupulously clean; the parents assiduously remove the droppings mixed with the wood particles that cover the floor of the nest. Apparently fresh particles are loosened for this purpose from time to time until the nestlings depart, thereby enlarging the chamber.

18. The development of the nestlings is slow. At the age of nine days they are still naked and blind. Because of misfortunes, it was not possible to determine the period the young remain in the nest, but this appears to be at least a month.

19. The young flew from one nest before nine o'clock in the morning. They still fly weakly despite the advanced age at which they normally depart. In the juvenal plumage they bear fairly close resemblance to their parents, with certain evident differences here described.

20. The newly emerged fledglings are led in the evening to sleep in the nest they have just left. The parents show them the doorway by going in and out many times over, until the youngsters succeed in following.

21. The parents at one nest were indefatigable in urging their two

fledglings to enter, continuing to show them how until the first gained the interior. Then they seemed to forget about the other, which flew weakly and was obliged to pass the night in the open, but with no ill effects.

22. Upon leaving the nest, the fledglings can utter the loud call of the adults, but in a weaker voice.

23. The young birds at first leave the dormitory considerably later in the morning than their parents. But after a few weeks, all depart at the same time.

24. Apparently only a single brood is raised each year.

25. After the close of the nesting season, a single barbet was found sleeping in a hole of the Hairy Woodpecker (*Dryobates villosus*) recently abandoned by its original occupants. Thus either woodpecker holes or holes made by the barbets themselves may serve as dormitories.

26. Among the enemies of adult barbets are the White-throated Falcon (*Falco albigularis*) and long-continued rainstorms which soak their plumage until they can not fly. The very thick doorway of the nest is a defense against the Blue-throated Toucanet (*Aulacorhynchus cæruleigularis*), an inveterate nest-robber of the same region. Yet, from five nests with eggs only two young were fledged.

27. The habits of the only other Costa Rican barbet, *Eubucco bourcieri salvini*, are briefly described. It contrasts strongly with the Prong-billed Barbet, being brightly colored, solitary, largely or wholly insectivorous, and habitually silent.

28. The habits of the Prong-billed Barbet are briefly compared with those of Old World species.

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Finca "Los Cusingos"
Quizarrá de Pérez Zeledón
Costa Rica

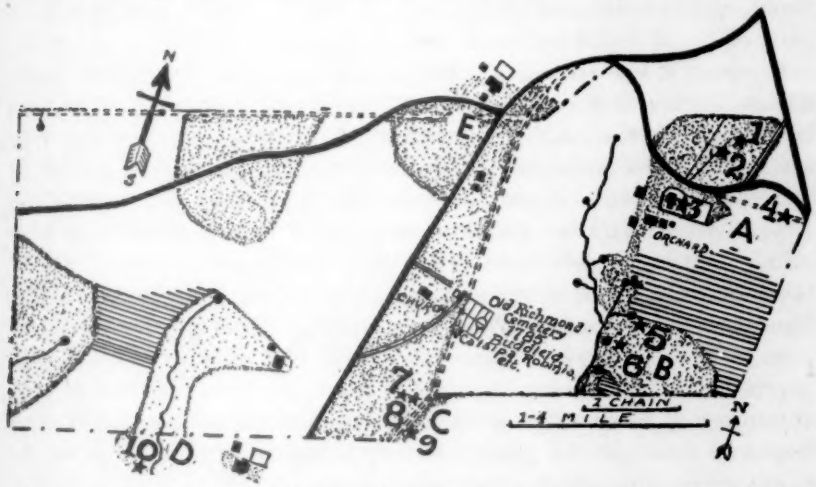
SEASONAL TERRITORY STUDIES OF RUBY-THROATS

BY A. L. PICKENS

"Do you sleep on your dining table?" Answering question with question, like an ancient Greek, this query is a fitting answer to those who enquire if Ruby-throated Hummingbird (*Archilochus colubris*) nesting areas are not in tangles of gorgeous flowers. Personal records of bird-flowers supplemented by those of a helpful group of correspondents from New England to California; Neltje Blanchan's 'Nature's Garden,' of which many specialists apparently remain ignorant; Otto Porsch's 'Grellrot als Vogelblumenfarbe' in Biologia Generalis, Band VII; Aretas A. Saunders's 'Ecology of Birds of Quaker Run Valley'; and F. W. Pennell's monumental work on the Scrophulariaceae—all these note the attraction of red flowers for hummers and other birds. But a nesting bird is not seeking display but is courting concealment. Remembering this will enable one to see that this article is not in conflict with the findings of our bird-flower-census takers.

The farm on which Old Richmond, church of Revolutionary veterans, began its historic career, of all areas has furnished the largest share of Ruby-throat nests for the personal notes used in this article. For this vicinity a total of ten was recorded, and all but one were visited personally. They fall naturally into four areas, A, B, C, and D, with a fifth very strongly indicated, which is provisionally noted as E (see Text-figure 1). Of ten nests, all were in the licheniferous post-oak (*Quercus minor*) except No. 3 in a sugar plum, and Nos. 7 and 8 in one yellow pine (*Pinus echinata*) at different times. No one was immediately near or above any brilliantly flowering tree, vine, or plot. Flowers immediately near were not ornithophilic. In fact, the spring-blooming fire-pink (*Silene virginica*), columbine (*Aquilegia canadensis*), pink-root (*Spigelia marylandica*), and coral honeysuckle (*Phenianthus sempervirens*) were found on this farm, if at all, merely as ornamentals, artificially transplanted. Cross-vine (*Anisostichus*

crucigera) was more usual. All these are roughly synchronous in blooming with the Ruby-throats' spring arrival. The even more specialized trumpet-creeper (*Bignonia radicans*), appearing much later, is remembered as a sparse growth at only one spot on the farm, on the road immediately north of Area A. The highly specialized and ornithophilic jewel-weed (*Impatiens biflora*) and cardinal-flower (*Lobelia cardinalis*) while appearing in July or earlier, flourish chiefly as late summer and autumnal flowers. The non-ornithophilic tulip

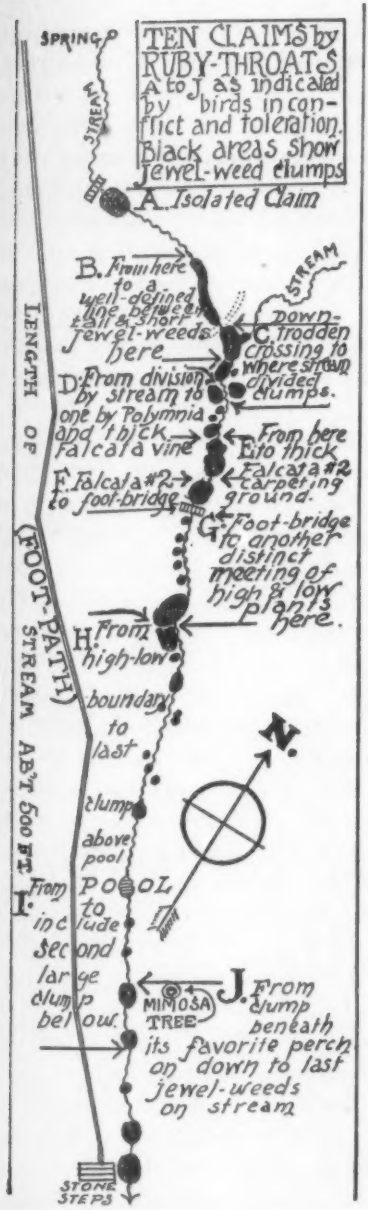


TEXT-FIG. 1.—Key: Numbered stars, 1–10, show nest sites; letters, A–E, nesting areas. Broad-leaf forest is shown in stipple; pine forest in line; cleared lands in white. Public roads are shown in black; private roads by parallel lines; old abandoned roads in parallel broken lines. Straight, thin, unbroken lines show paths; if winding, streams. Multangular spots show land-owners' homes; rectangular spots, other buildings; circular spots, springs; enclosed white spaces, gardens with a floral attraction. Dot-dash line indicates where farm boundary does not follow a road. (Base-map by courtesy of R. W. Pickens.)

poplar (*Liriodendron tulipifera*) occurred near all nests! If this be anything more than mere coincidence, the short-seasoned, greenish, orange-banded flowers may be no more an attraction than the abundant aphids and the resultant honey-dew found on the leaves. Sourwood (*Oxydendron arboreum*) was found in or near almost all if not all these nesting areas. Its white clusters are evidently familiar sources of nectar, for such, when placed near feeding bottles, were quickly and familiarly visited, flower by flower. Japanese honeysuckle (*Nintooa japonica*), easily available for both A and B, literally carpeted the forest floor about C, and was abundant near E. Smooth gooseberry (*Polycodium*) and tree huckleberry (*Batodendron arbor-*

eum), distinctly marked for A, occurred in or near a majority of the areas. A and B each had its own sap-leak such as we find in the bark of scarlet oak (*Quercus coccinea*). The birds drink escaping sap and eat the small insects that become trapped in its flow. Each area related itself rather distinctly to a farmhouse and garden where flowers are fairly a tradition, or, in the case of C, to the church and cemetery, until recent years a place of floral plantings, and bearing the only catalpa trees (*Catalpa catalpa*) in the community. The intervening garden was visited by both A and B. Each area was in a body of virgin broad-leaf, each about a quarter-mile from its neighbor, and more or less set off, if not entirely separated, by cleared land. Messrs. Henry Garrison, William Watson, and Joseph Martin aided in extending this list by three nests. The first, about a half-mile east of Old Richmond farm, was conventionally located in an oak in a grove; the next, a similar distance south, was in a dogwood (*Cynoxylon floridum*) after the flowering season; but the last was in a mimosa (*Albizzia julibrissin*) apparently during the flowering season. Some distance to the north in a mountain valley, a personal find was located in a scrub pine (*Pinus virginiana*). What was unusual, this pine grew in a pine grove (a very narrow one though) and the nesting tree was in the very edge of the grove, by a mill-pond and near a number of cottages, and an abundant growth of broad-leaf trees bordered much of the pond. So much for fourteen nests from the upper Piedmont and the lower mountains.

Mr. A. R. Heyward, of Columbia, South Carolina, was one of a group that located a large series of nests along the border between the lower Piedmont and the coastal plain. In this sandhill evironment oaks are inclined to be scrubby. Five nests were in pines, one of these being in a pine in a pine forest, but not far from a cleared field to the west and a forested swamp that ran along a stream to the south. Two were in hickories; one was in an eighty-foot tulip poplar, forty feet from the ground; only one was found in an oak; while black gum (*Nyssa* sp.) yielded another, and perhaps the same species or a close relative was occupied by an eleventh. In contrast to the ample area about each Old Richmond nest, where no one area ever showed two occupied nests at the same time, Mr. Heyward on one day found two occupied nests about an acre-width apart. But a road, such a boundary as many breeding birds recognize, ran between the two, fifty yards from one nest to the east, and twenty from one to the west. Nests were not found at any time in the huge-coned long-leaf and loblolly or frankincense pines; smaller cones of course offer better camouflage when they are silhouetted against the sky, and one nest


TEN CLAIMS by RUBY-THROATS A to J as indicated by birds in conflict and toleration. Black areas show jewel-weed clumps
SPRING
STREAM
A. Isolated Claim
B. From here to a well-defined line between tall & short jewel-weeds here
C. Down-trodden crossing to where stream divided clumps.
D. From division by stream to one by Polymnia and thick Falcata vine
From here E to thick Falcata #2 carpeting ground.
F. Falcata #2 to foot-bridge
G. Foot-bridge to another distinct meeting of high & low plants here.
H. From high-low boundary to last clump above pool
POOL
I. From to include second large clump below
J. From clump beneath its favorite perch on down to last jewel-weeds on stream
MIMOSA TREE
N.
LENGTH OF (FOOT-PATH) STREAM AB'T 500 FT.
STONE STEPS

TEXT-FIG. 2.—Autumnal claims of migrant Ruby-throats on Crow-toe Brook in Cleveland Park at the confluence of Reedy River and Richland Creek, South Carolina.

was actually saddled on a horizontal cone.

Paradoxically, a family that dominates thirty to fifty acres during the breeding season separates in late summer and autumn, and each individual jealously guards some little floral holding which a living-room rug would often dwarf (see Text-figure 2). The Crow-toe Brook, which forms a diminutive middle toe of a crowfoot at the confluence of Reedy River and Richland Creek in South Carolina, with ten claims is a good example of local autumnal distribution to contrast with the summer areas of Old Richmond farm. Watching such a Klondike of floral gold one readily comes to recognize distinct boundary marks up to which a bird may feed without its neighbor attacking it. At times these are obviously marked by path or footbridge, and again the recognized boundary will be what a human eye may not have noticed before—a winding line in a plot of jewelweed, to one side of which grow tall plants and to the other short ones. Disputed territory frequently occurs. Thus while A has an isolated and undisputed holding, B claims downstream to where a sharp tall-short boundary divides one clump, but C tolerates this claim only to where downtrodden plants mark a maverick foot-path across the water; and tolerant as to the remainder of their respective holdings, here they are constantly fighting. Still farther down, the

holder of a magnificent stake sits calm and unruffled until a neighbor passes over a distinct break in the line of jewel-weed where rank *Polymnia* and *Falcata* smother out the desired flowers. A similar smothering-out downstream is guarded likewise. Thus it runs, until the last claimant on the brook below wages squeaky battle with the next neighbor upstream, not so much perhaps over two disputed clumps of flowers, as over its right to keep all invaders out of a spot beneath the favorite perch it has selected in an overshading mimosa tree. An animated spot indeed is such a glen until some morning, a vague touch of autumn in the air, we return to find most of the bickering claimants gone, and one or two loitering vagrants, wide-spaced and peaceful, gathering the nectar from a depleted number of the later flowers.

Along a flowering glen such as the one just described, even at the height of the season, keeping separate check-up on each individual is a comparatively easy matter. Each birds picks an observation perch immediately above the flower-bed from which it feeds. It descends now and again for nectar and habitually returns, not merely to the same tree, but actually to the same branch or twig, preferably a fairly or wholly bare one, which enables the occupant to survey at a sweeping glance the whole of its floral protectorate; for example, the bird that habitually occupied the particular mimosa branch just noticed. Upstream, another bird faithfully occupied a partially bare dogwood branch, sweeping down over its flower-bed, and still farther up one used the twigs of a rather bare if not dead limb as its private outlook. On such a claimant I could call with the assurance it would be at home, or would return within a few moments. Thus, in a short space of some five hundred feet in a rather open grove, and provided with a six-power field-glass, a fair degree of distinction between individuals is possible without the necessity of banding. Not only can one distinguish individuals; he even comes to recognize individual appetites, temperaments, and tempers.

Wide spacing between nesting areas, the distinctive note of the newly flying young—a shrill and far-reaching whisper, and the tendency to linger for some time in the vicinity of the abandoned nest, facilitate the keeping of separate notes on separate broods. Banding might demonstrate that such nesting areas are individual or even ancestral holdings from year to year, but such observations would require residence on or near the farm where the studies were made.

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APPARENT STATUS OF THE EUROPEAN WIDGEON IN NORTH AMERICA

BY EDWIN M. HASBROUCK

ON December 3, 1842, the first recorded American specimen of the European Widgeon (*Mareca penelope*) was purchased in Fulton Market, New York City. It had been killed in the Bay of Long Island.

For many years there appeared occasional records of the occurrence of this bird in widely separated localities both on the Atlantic and Pacific coasts as well as in the interior, generally accompanied by the statement that it was a "straggler," of "rare occurrence," an "occasional visitor from a foreign land," etc.

For many years, also, it was (and by many people still is) considered a visitor on the eastern coast from Iceland by way of Greenland, and on the western coast from Siberia by way of the Aleutian Islands and Alaska. The fact that three of the Atlantic Coast birds had previously been banded in Iceland has lent considerable weight to this hypothesis, as has also the fact that the species has never been known to breed in North America.

As long as the records were comparatively few in number, this theory was quite plausible, but with the multiplication of records beginning along in the 1880's, it became apparent that the bird was more than a casual visitor or straggler. In fact, in one region on the Pacific coast—Portland—it was even said to be common.

After a careful search of the literature I have collected 596 records, both sight and specimen. I feel quite certain that I have missed some, possibly many, as so many have been published in obscure and little-read literature; but admitting this, enough records have been obtained, I think, to show an interesting situation, and I doubt if additional records will alter the picture.

In lists Nos. 1, 2, and 3 for the three main areas mentioned later, sight records have been designated *"vis.";* birds collected, *"sp."* Of these 596 records, 94 are without sufficiently complete data for plotting (see list No. 4), except for spotting on the map for locality. It will be readily seen, as stated above, that there are far too many occurrences for them to be accidental, and furthermore it must be borne in mind that many of the specimen records were made in the short period of the gunning season, leaving the rest of the months with but few observers, although during this time the species undoubtedly did occur.

Phillips and Lincoln ('American Waterfowl': 293, 1930) state that "from the capture of at least three specimens on our East coast that were banded in Iceland, it would appear likely that all our eastern

specimens come from that source." A few evidently do so, the same as other birds occasionally turn up in unusual places far from their accustomed haunts.

Probably it was at one time an exclusively Old World species; when it invaded North America will of course never be known, but that it originally came either by way of Greenland from Iceland, or by way of the Aleutian Islands from Siberia, or both, is probably an indisputable assumption. The fact that three specimens banded in Iceland have been taken on the Atlantic coast is prima-facie evidence at least of the Greenland-Iceland route.

Of course, in the early days of American ornithology, observers were far less numerous than since the 1880's and, as a consequence, the Widgeon was considered a rare and unusual bird and, by most writers, a straggler from Iceland and Siberia. Whether or not the multiplicity of records we now have is due entirely to a greater number of observers or to a fixed North American stock whose breeding grounds have yet to be discovered, I am unable to say; but I am inclined to the latter belief for the following reasons. First, the records show a definite southerly migration in fall and winter down both the Atlantic and Pacific coasts, with a corresponding northerly spring migration up the great Mississippi flyway in company with other wildfowl, almost entirely in March and April. Secondly, there is a thin line of records extending north and centrally as far as Fort Rae on Great Slave Lake (observers are very few in these regions—practically none), whose dates suggest that those extreme northern birds were not far from their breeding grounds.

Winter comes early in those northern latitudes, and the Fort Rae bird certainly did not come from Siberia or Iceland. It was taken August 22 and, in my opinion, was on its way south from its not-far-distant breeding ground. The same might be said of the Lake Winnipeg bird taken September 1. Conversely, the birds taken at Big Spirit Lake, Minnesota, on May 16, at Twin Lakes, Minnesota, on June 5, and at Minneapolis on April 6 were on their way north to those same not-too-distant breeding grounds.

For the purpose of the present study, I have divided North America into three main areas—Atlantic Coastal Region, Pacific Coastal Region, and Interior Region, and have attempted to show in Table 1 the regional distribution of the records in those three divisions of North America as follows:

ATLANTIC COASTAL REGION.—That territory extending from Greenland to Florida. Definite records are from Greenland, Labrador,

Quebec, Newfoundland, Nova Scotia, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York (eastern) and Long Island, Pennsylvania (eastern), Delaware, Maryland and District of Columbia, Virginia, North Carolina, South Carolina, Georgia, and Florida.

PACIFIC COASTAL REGION.—That territory lying from Bering Sea to the extreme upper portion of Mexico (Tiajuana) and west of the Sierra Nevada and Cascade ranges.—Definite records are from Alaska, British Columbia, Washington, Oregon, California, and Mexico.

INTERIOR REGION.—All territory, including interior Canada, lying between the fringe of eastern coastal states and the Sierra Nevada and Cascade ranges. Definite records are from New York (central and western), Pennsylvania (western), Ohio, Ontario, Illinois, Kentucky, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Nebraska, Wyoming, Canada (interior), Louisiana, and Texas.

I have also separated the months into two seasonal divisions—October 1 to March 31 (fall and winter) and April 1 to September 30 (spring and summer)—and have attempted to show that the period from October 1 to March 31 is that during which a southward movement is evident in the two coastal areas, while that from April 1 to September 30 includes a decidedly northerly movement up the interior flyway. Of course, there are a few straggling 'off' records. Where the border line is drawn very closely I have placed the record in the nearest appropriate division, as for instance, September 29 or 30 would be placed in October, and April 1 or 2 would be put in March.

The table shows that on the Atlantic coast the bulk of the birds are southbound migrants; and that on the Pacific coast a southern

TABLE 1

ATLANTIC COASTAL REGION

October 1 to March 31	*April 1 to September 30*	*Total*
251	23	274

PACIFIC COASTAL REGION

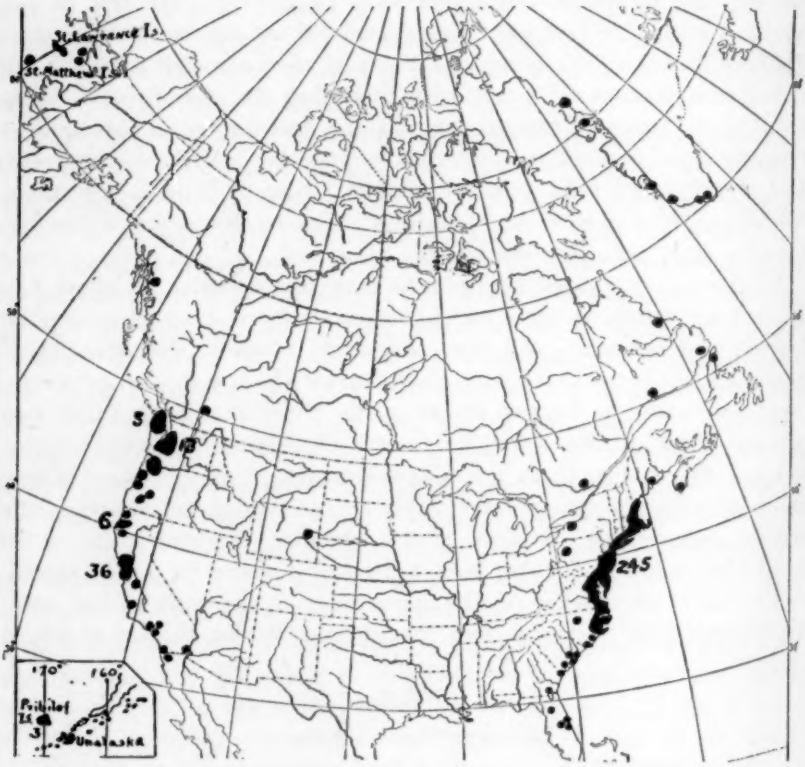
October 1 to March 31	*April 1 to September 30*	*Total*
74	7	81

INTERIOR REGION

October 1 to March 31	*April 1 to September 30*	*Total*
34	131	165

The above table comprises a total of 520 records. The discrepancy of 76 records between this and the 596 grand total is accounted for by the many records in List No. 2 that could not be used in compiling this table.

migration also takes place in the fall and winter, while an apparent spring migration occurs in the Interior Region, up the great central flyway in company with other wildfowl. Ten records from the two Gulf states, Louisiana and Texas, were apparently of wandering migrants passing the winter and early spring in those localities. They



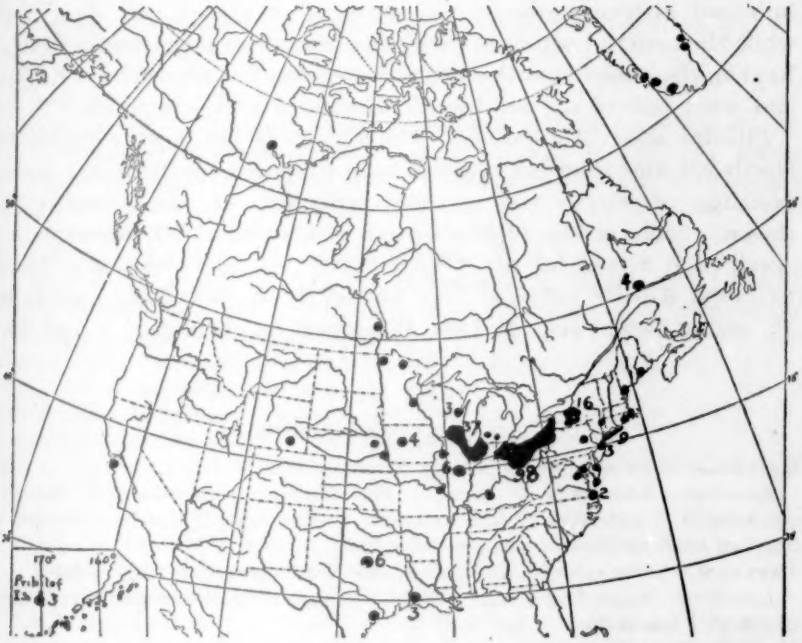
TEXT-FIG. 1.—Fall and winter records of the European Widgeon—the southward migration.

were pretty evenly divided as to seasonal occurrence; six were from October 1 to March 31, and four on April 18, 21, 24, and 26, respectively.

The table is compiled strictly according to the seasonal divisions of October 1 to March 31, and April 1 to September 30, but in the Atlantic Coastal Division there are a few records occurring so early in April—from the 1st to the 7th—that they might rightly be in-

cluded in the winter list, and they have been so placed. A few scattered similar instances occur in the Interior Region.

Of the 596 records, 94 have incomplete data in one form or another as shown in List No. 4. Of these, 19 are definitely shown to come within the "fall and winter" classification, and five are definitely shown to belong under "spring and summer." These have been used only in compiling the seasonal classification in the table. In 29 records the year only is given, while in 23 there are no dates what-



TEXT-FIG. 2.—Spring and summer records of the European Widgeon—the northward migration.

ever. Fortunately, all these records have the localities and have been used for spotting on the map.

There are two maps. One (Text-figure 1) shows the fall and winter records illustrating the southward migration; the other (Text-figure 2), the spring and summer records marking the northward movement in the interior. They cover all of the 596 records, but where localities are close together the area occupied by them is solidly shaded. These spots also may cover a wide area far beyond the actual locality. The number of records from these complex areas is shown by a large

adjacent numeral. It will be realized that the maps are designed to give only a comprehensive picture of the total number of records and their distribution.

Lists Nos. 1, 2, and 3 give every record collected for the three areas with the accompanying data, and state whether the record is based on sight or a specimen. Occasionally a few citations are made under 'Remarks.'

Referring once more to the maps, it must be explained that it was found necessary to separate both New York and Pennsylvania into two divisions—eastern and western. A glance will show that while the eastern portion of each state belongs to the Atlantic Coastal Region, the western portions clearly come within the Interior Region and are a part of the northward Mississippi Valley migration.

Phillips says: "Undoubtedly the species is far more common in North America than has hitherto been supposed, as the recent multiplication of records and my own experience in Massachusetts has shown. Some of the earlier writers (Turnbull, 1869, for example) speak of it as regular in its appearance . . . specimens were taken by Frank Russell (1898) at Fort Rae on Great Slave Lake on August 22, and at Grand Rapids, Lake Winnipeg, on September 1, and they

LIST NO. 1

ATLANTIC COASTAL REGION

GREENLAND.—Fifteen records (all *sp.*). Sept. 1 to Dec. 17.

Localities:—Anmagsalik, 2; Arsuk, 1; Frederikshaab, 1; Godthaab, 1; Holsteinborg, 1; Nanortalik, 1; Quaersuarssuk, 1; Tasinsak, 1; Umanaq District, 1; east coast (no further data), 4; Julianhaab, 1.

LABRADOR.—Three records (all *sp.*). Nov. and Oct. One record with no data.

Localities:—Bonne Esperance, 1; Seal Cove, just south of Makkovik, 1; Piashta Bay, 1 (no data).

QUEBEC.—Five records (1 *sp.*; 4 *vis.*). Fall of 1926 1, (probably October) to June 13.

Localities:—Lochaber, 1; Niapisca Island, six miles west of Esquimaux Point, Mingan Island, 4.

NEWFOUNDLAND.—One record. (*sp.*). Oct. 5.

Locality:—Stephensville Crossing.

NOVA SCOTIA.—One record (*sp.*). Dec. 1.

Locality:—Cape Sable Island. In company with two other ducks said to have been the same, but the reporter (H. Piers), says they might have been Baldpates.

MAINE.—Thirty-one records (9 *sp.*; 22 *vis.*). Oct. 25 through fall, winter, spring, and summer to Sept. 20.

Localities:—Cape Elizabeth, 1; Falmouth, 2; Jefferson [a flock of 21 birds alighted in a pond near the house (letter from A. L. Carter of Jefferson, Me., dated Nov. 26, 1924, to G. J. Stobie Commissioner F. & G., Augusta, Me., and sent by him to Biological Survey)]; Merrymeeting Bay, 1; Scarborough, 5; Swan Island, 1.

NEW HAMPSHIRE.—Two records (plus), (2 *sp.*; several *vis.*). Nov. 14 to 17. (Was

told that a flock of twenty or thirty had been feeding in Great Bay for several days.)

Localities:—Peabrook, 1; Great Bay, several.

MASSACHUSETTS.—One hundred and nine records (34 *sp.*; 75 *vis.*). Oct. 6 to May 22.

Localities:—Belmont, 1; Beverly, 2; Boston Park System, 1; Bridgewater, 8; Chappaquiddick Island, 1; Great Pond, Cape Cod, 1; Halifax, 1; Jamaica Pond, 8; Ipswich, 1; Leverett Pond, 2; Marblehead, 1; Martha's Vineyard, 43; Nantucket, 3; Nippinickett Pond, near Bridgewater, 6; Northampton, 3; Sengegontacket Pond, Martha's Vineyard, 4; Squibnocket Pond, Martha's Vineyard, 10; Wenham Lake, Boston, 13.

RHODE ISLAND.—Five records (1 *sp;* 4 *vis.*). Sept. 20 to Nov. 13.

Localities:—Gardiner's Pond, Middletown, 2; Middletown, 1; Newport, 2.

CONNECTICUT.—One record (*sp.*). Jan 2.

NEW YORK (eastern) and LONG ISLAND.—Thirty-two records (18 *sp;* 14 *vis.*). Sept. 2 to April 29.

Localities:—Bay of Long Island (first record for N. A.); Gardiner's Bay, 7; Gardiner's Island, 4; Irondequoit Bay, L. I., 2; "Market" N. Y. City, 1; Mastic, Moriches Bay, L. I., 1; "Long Island," 3; Mecox Bay, L. I., 1; Moriches Bay, L. I., 2; North Inlet, Gardiner's Island, 2; Oakdale, L. I., 1; Peconic Bay, 1; Pelham Bay, 2; Southampton, 3; Cruger's Island, Dutchess Co., 1.

NEW JERSEY.—Twelve records (7 *sp.*; 5 *vis.*). Oct. 29 to April 30.

Localities:—Barnegat Bay ("*sps.*"), Delaware Bay, 1; Englewood, 1; Leonia, 1; Little Egg Harbor Inlet, 1; Marshalltown, 1; Point Pleasant Ponds, near New York, 2; Tuckerton, 3; Troy Meadows, 1.

PENNSYLVANIA (eastern).—Four records (all *vis.*). Feb. 26 to May 8.

Locality:—Lake Ontelaunee, 4.

DELAWARE.—Seven records (all *vis.*). Jan. 13 to April 11.

Localities:—Delaware City, 3; Rehobeth Beach, 4.

MARYLAND and DISTRICT OF COLUMBIA.—Twelve records (all *sp.*). Oct. 16 to July 15.

Localities:—Cambridge, Colston Lake, 1; Carroll Island Club, 1; "Chesapeake Bay," 4; Coast Maryland, 1; Havre-de-Grace, 1; Susquehanna Flats, 1; Washington, D. C. Market, 1; Baltimore, 1; Nanjemoy Creek, 1.

VIRGINIA.—Twenty records (all *sp.*). "Fall" to "Spring."

Localities:—Alexandria, 2; Aquia Creek, 1; Back Bay, 6; Broadwater, Northampton Co., 1; "Coast Virginia," 1; False Cape Club, Princess Anne Co., 2; James River, 2; Neabsco Creek, 1; North Bay, 2; Potomac River, 1; Virginia Beach, 1.

NORTH CAROLINA.—Thirty-five records (31 *sp.*, 4 *vis.*). Nov. 12 to March 29.

Localities:—Bodie Island Light, 1; Bulls Island, 1; various localities on Currituck Sound, 27; Hatteras, 1; New River Inlet, 2; Pea Island, 2; Raleigh, 1.

SOUTH CAROLINA.—Four records (all *sp.*). "Winter" to March 4.

Localities:—Middleburg Plantation, Cooper River, 2; Mulberry Plantation, Cooper River, 1; Long View Plantation, Combahee River, 1. (Mulberry Plantation and one record from Middleburg Plantation are without any dates whatever.)

GEORGIA.—Three records (all *sp.*). Jan. 31, "Sometime" from Jan. to July 1908. One no data.

Localities:—Okefenokee Swamp, 1; Savannah, 1; Chatham Co., 1.

FLORIDA.—Five records (all *sp.*). Dec. 26 to Feb. 26.

Localities:—"Florida," no locality, 1; near Titusville, 3; Orange Lake, near McIntosh, 1.

LIST NO. 2

PACIFIC COASTAL REGION

ALASKA.—Ten records (all *sp.*). Oct. 12 to Aug. 5.

Localities:—King Island, 2; Pribilof and Aleutians, 1; St. Paul Island, 4; St. Lawrence Island, 1; St. Matthew Island, 1 (based on a single wing found nailed to the wall of a cabin near Cape Glory, Russian Siberia. It might have been brought from somewhere else); Unalaska, 1.

BRITISH COLUMBIA.—Six records (5 *sp.*; 1 *vis.*). Dec. 9 to Jan. 24.

Localities:—Comox Harbor, 1; Haro Strait near Bare Island, 1; near Victoria, 1; Okanagan, 1; Saanich, 1; Stikine River Flats, 1.

WASHINGTON.—Fifteen records (11 *sp.*; 4 *vis.*). Oct. 30 to March 31.

Localities:—Everett, 1; Lake Washington, 1; Lower Puget Sound, 1; Nisquilly Flats, near Tacoma, 8; Oakland, near Tacoma, 1; Saanich Bay, 1; Seattle, 2.

OREGON.—Sixteen records (12 *sp.*; 4 *vis.*). Oct. 18 to Jan. 18.

Localities:—Eugene, twelve miles northwest of Portland, 1; Government Island, 1; Lane Co., 1; Netarts Bay, 2; Portland, 3; Sauvies Island, 8; one Portland record by Deignan, unpublished.

CALIFORNIA.—Fifty records (23 *sp.*; 27 *vis.*). Oct. 20 to June 27.

Localities:—Arcata Bay, 2; Bixby, 3; Brawley, Imperial Co., 2; Eureka, 2; Franklin Canyon Reservoir, 1; Gray Lodge Refuge, 1; Grizzly Island, Solano Co., 1; Guadalupe, 1; Humboldt Bay, 3; Lake Merritt, 16; Los Banos, Merced Co., 1; Merced Co., 1; Norman, Glenn Co., 1; Oakland, 8; Rio Vista, Solano Co., 2; San Francisco, 5.

MEXICO.—Two records (*sp.*). Jan. 13.

LIST No. 3

INTERIOR REGION

NEW YORK (central and western).—Twenty-two records (4 *sp.*; 18 *vis.*). March 7 to May 15. (There are two 'freak' records beyond this period—Dec. 25 and Jan. 28.)

Localities:—Amherst Township, Erie Co., 1; Buffalo, 3; Canandaigua, 2; Clarence, near Buffalo, 1; Cayuga Lake and marshes, 3; Keuka Lake, 5; Montezuma marshes, Seneca River, 1; Niagara Falls, 1; near Lason or Albion, 1; Rochester, 4.

PENNSYLVANIA (western).—Thirty-three records (2 *sp.*; 31 *vis.*). March 22 to April 29.

Localities:—Erie Bay, 3; Hartstown, 6; Linesville (several seen); Presque Isle, 3; Port Alleghany, 4; Pymatuning Lake, 15; Williamsville, 1.

OHIO.—Forty-two records (12 *sp.*; 30 *vis.*). March 21 to May 4. (There are four 'freak' records beyond this period; Oct. 3 and 6, Oct. 6, and Dec. 30.)

Localities:—Beaver Lake, near Salem, 1; Buckeye Lake, near Columbus, 9; Cleveland, 1; Granville, 2; Huron, 2; Liebs Island, 2; Painesville, 4; Pymatuning Lake, 2; Port Clinton, 1; Salem, 2; Sandusky, 3; Toledo, 7; Waterville, 1; Willoughby, 1; Youngstown, 4.

ONTARIO.—One record (*sp.*). In 1916.

INDIANA.—Nineteen records (10 *sp.*; 9 *vis.*). March 23 to May 5.

Localities:—English Lake, 5; Hobart, 9; Kankakee marshes, near Thayer, 5.

ILLINOIS.—Fourteen records (9 *sp.*; 5 *vis.*). March (?) to April (17 or later).

Localities:—Calumet marsh, 1; Chicago, 4; Lake Decatur, 1; Illinois River, 1; near Mt. Zion, 4; Nippersink Lake, 1; Snackwine Lake, 1; nine miles from Decatur, 1.

KENTUCKY.—Three records (1 *sp.*; 2 *vis.*). Feb. 22 to Feb. 28.
Locality:—Six miles east of Louisville. (Flock of three seen Feb. 22, and one of them secured on Feb. 28; the only records for Kentucky.)
MICHIGAN.—Fifteen records (5 *sp.*; 10 *vis.*). March 27 to April 23.
Localities:—Monroe, Monroe marshes, and Monroe Co., 13; Portage Lake, 1; Vicksburg, 1.
WISCONSIN.—Fifteen records (8 *sp.*; 7 *vis.*). April 3 to June 12. (Also two records, Oct. 23 and Nov. 11 that, in my opinion, were of birds coming south from their breeding grounds in the far north.)
Localities:—Dane Co., 1; Green Bay, 2; Lake Koshkonong, 3; Lake Mendota, 2; Madison, 6; Lake Winnebago, 1.
MINNESOTA.—Three records (all *vis.*). April 6 to June 5.
Localities:—Big Spirit Lake, 1; Minnesota slough, near Minneapolis, 1; Twin Lakes, Kittson Co., 1.
IOWA.—Four records (1 *sp.*; 3 *vis.*). All Oct., 1933.
Locality:—North Twin Lakes, Calhoun Co., 4.
MISSOURI.—One record (*sp.*). April 10.
NEBRASKA.—Two records (*sp.*). No data.
One taken by Bruner "years ago" at West Point. "Formerly seen in Omaha markets on rare occasions."
WYOMING.—Two records (1 *sp.*; 1 *vis?*). Oct. 3, 1910.
Locality:—Hat Creek, Converse Co., 1. McCreary and Mickey in a paper (1933) state: "Accidental, casual and rare in South Eastern Wyoming."
CANADA (interior).—Two records (*sp.*). Aug. 22 to Sept. 1.
Localities:—Grand Rapids, Lake Winnipeg, 1; Fort Rae, Great Slave Lake, 1.
LOUISIANA.—Three records (*vis.*). Winter, 1915.
Locality:—Cameron Farm, Cameron Parish, fourteen miles south of Victoria, 3.
TEXAS.—Seven records (2 *sp.*; 5 *vis.*). Oct. 21 to April 26.
Localities:—Corpus Christi, 1; Dallas, 6.

LIST NO. 4

RECORDS WITH INDEFINITE DATA

Sept. to Nov.	Julianhaab, Greenland
Sept. to Nov.	Nanortalik, Greenland
Sept. to Nov.	Godthaab, Greenland
Sept. to Nov.	Frederikshaab, Greenland
	District of Umanaq, Greenland
	Qaersuarssuk, Greenland
	East coast of Greenland (four)
Winter, 1899	Long Island
1903	Gardiner's Island, N. Y.
1885	Long Island
1902	Southampton, L. I.
Autumn, 1903	Southampton, L. I.
March 19, —	Buffalo Harbor
April 23, —	Buffalo Harbor
1903	Gardiner's Island, N. Y.
	Cayuga Marshes, N. Y.
1858	Long Island
1897	Currituck Shooting Club, N. C.

1887	Currituck Sound
Spring, 1863	Alexandria, Va.
	James River, Va.
	Alexandria, Va.
Fall, 1911	Broadwater, Northampton Co., Va.
1855	Tuckerton, N. J.
March, 1887	Delaware River, N. J.
"Others"	Tuckerton, N. J.
1878–1879	Barnegat Bay, N. J. (several)
Spring, 1880 or 1881	Vicinity of Englewood, N. J.
	Tuckerton and Big Bay, N. J. (several)
Spring, 1880 or 1881	Leonia, N. J.
	Little Egg Hatbor Inlet, N. J. (several)
	Baltimore, Md.
	Piashte Bay, Labrador
Winter, 1926–1927	Middleburg Plantation, Cooper River, S. C.
	Middleburg Plantation, Cooper River, S. C.
	Mulberry Plantation, Cooper River, S. C.
	Savannah, Ga.
1845	"Florida"
Fall, 1926 (October?)	Lochaber, Quebec
May, 1880	Cayuga Lake, N. Y.
Spring, 1881	Cayuga Lake, N. Y.
	Cayuga Marshes, N. Y.
1875	Williamsville, Elk Co., Penna.
	Erie Bay, Penna.
1916	Long Point, Lake Erie, Ont.
1898	Monroe, Mich.
1901–1902	Monroe Marshes, Lake Erie, Mich.
1901–1902	Monroe Marshes, Lake Erie, Mich.
1901–1902	Monroe Marshes, Lake Erie, Mich.
1881 or 1882	English Lake, Indiana
	English Lake, Indiana
March and April, 1931	Near Mt. Zion, Ill.
March and April, 1931	Near Mt. Zion, Ill.
March and April, 1931	Near Mr. Zion, Ill.
March and April, 1931	Near Mt. Zion, Ill.
	Lake Decatur, Ill.
	Near Chicago, Ill.
	Illinois River
"Years ago"	West Point, Neb.
"Specimens"	Omaha, Neb.
	South Eastern Wyo.
1874	Lake Mendota, Wis.
1877	Lake Koshkonong, Wis.
1877	Lake Koshkonong, Wis.
1875	Lake Koshkonong, Wis.
1876	Lake Mendota, Wis.
	Dane Co., Wis.
1937	Oakland, Wash.

1905 (?)	Eureka, Calif.
1936	Oakland, Calif.
1932	Oakland, Calif.
1933	Oakland, Calif.
1934	Oakland, Calif.
1935	Oakland, Calif.
	San Francisco, Calif. (albino)
Winter	San Francisco market (several)
1886	Eureka, Humboldt Co., Calif.
	Humboldt Bay, Calif.
	Humboldt Bay, Calif.
	Bixby, Los Angeles Co., Calif.
Winter, 1884	Humboldt, Co., Calif.
Winter	San Francisco market, Calif.
Winter, 1920–1921	Lake Merritt, San Francisco, Calif.
	Saanich, British Columbia
Winter, 1921–1922	Wintered in Comox Harbor, B. C.
	Stikine River Flats, B. C.
	Twin Willows, Sauvies Island, Ore.
1930	St. Lawrence Island, Alaska
	St. Pauls Island, Alaska
1881	"Pribilof and Aleutians"

are certainly extraordinary. Nevertheless, it is worth recording that Richardson (*fide* Baird, Brewer, and Ridgway, 1884) long expressed the belief that the species breeds in the wooded region of the fur countries and north to 68 latitude. This statement, taken in conjunction with the fact that the great majority of the records for both coasts are winter occurrences while the majority of the inland records are spring records, would almost suggest the existence of an American stock resident in this continent, and migrating along the same routes as its native relative. The statement has often been made that the species breeds in the Aleutian Islands, but I must confess that after a careful search I have been unable to find any evidence to support it. . . . To my knowledge, there is no evidence that the species has ever bred in North America, though I am inclined to think that it may do so."

My own records, now eighteen years later, are far more numerous than those available to Phillips, but they bear out his statements, and I am forced to agree with his suggestion of the existence of an American stock resident on the North American continent and breeding *somewhere* in the far north. The breeding area is possibly quite circumscribed as in the case of the Blue Goose and the more recently discovered breeding grounds of the Ross's Goose. The Gavin and Donovan party, in search of Ross's Goose, does not mention it and

it seems almost certain they would have done so had they met with it, as they mention having seen other species of waterfowl, notably Pintails. It must be borne in mind, however, that apparently no actual search was made for anything else.

SUMMARY

The species is far more abundant in North America than has been previously supposed.

There have been at least three captures on the Atlantic coast of birds banded in Iceland, with no banding records on the west coast of birds from Siberia. This does not necessarily mean that all birds occurring on the Atlantic seaboard are migrants from Iceland, but rather that a bird of so wide a distribution does occasionally stray from Iceland through Greenland and on to the North American continent.

A definite southerly migration extends along the entire Atlantic coast in the fall and winter months as far as east-central Florida.

A similar southerly movement occurs on the Pacific coast at the same time as far south as extreme northern Mexico (Tiajuana).

A marked northerly spring migration occurs up the Mississippi flyway mostly in April and May in company with other wildfowl. Strange to say, most Alaskan records, with two exceptions, were made in the spring and summer months—April, May, July, and August (three records without full data). This might suggest either that the birds on their northern migration had arrived somewhere near their breeding grounds in North America, or that they were on their way to Siberia.

The species is found not only singly or in pairs, but also in small flocks by itself or often in company with its near relative, *M. americana*.

The southerly fall and northerly spring migrations strongly suggest a fixed American stock breeding somewhere in Arctic America, the locality yet to be discovered. I am thoroughly in accord with Phillips in this conclusion.

In preparing this paper my thanks are due to the United States National Museum and the Fish and Wildlife Service for the facilities they have so generously placed at my disposal. More especially are my thanks due Dr. Herbert Friedmann, Curator of Birds of the U. S. National Museum, for many suggestions and criticisms, and also to Dr. H. C. Oberholser, Mr. H. G. Deignan and the late Mr. J. H. Riley.

U. S. National Museum
Washington, D. C.

SOME ALASKAN NOTES

BY IRA N. GABRIELSON

LIKE other ornithologists, I had long dreamed of visiting Alaska to see its famous bird colonies and fascinating wildlife. For one reason or another the trip was postponed until the summer of 1940 and when it did materialize, it came not as an ornithologist might plan but as a business trip, the primary purpose of which was to get acquainted with the personnel and problems of the newly formed Fish and Wildlife Service. A rather strenuous traveling schedule made it impossible to work any area thoroughly for birds. Effort was made to keep as detailed notes as possible in order to reveal something of the relative local abundance of the more widely-ranging species, and it is believed that these notes will be of value in this respect as well as in furnishing the definite locality records that are much needed.

The notes on small land birds are rather sketchy as little time could be given to locating and identifying small brush- and tree-inhabiting forms. Sea birds were often passed at a distance too great to permit identification, and the records of such forms as the Marbled Murrelet, Cassin's Auklet, California Murre, Pigeon Guillemot, and Tufted Puffin no doubt fall far short of giving an accurate idea of the relative abundance of these species along our route in southeastern Alaska. It was my practice to list only the species and numbers of individuals that could be accurately identified even though there might be additional thousands of birds within sight at the time. As a consequence my notes are full of references to auklets, murrelets, gulls, cormorants, and the like, not further identified.

Altogether the trip was one of the richest ornithological experiences in my twenty-eight years of work for the Biological Survey—now the Fish and Wildlife Service. The great bird colonies so far exceeded expectations as to leave me standing in somewhat dazed wonder at the spectacle they presented.

It is safe to say that the islands of the coast of Alaska, particularly from the Kenai Peninsula westward, together with those belonging to the United States in Bering Sea, undoubtedly have the most spectacular series of bird colonies to be found in North America. They far surpass any of the better known gull, tern, gannet, pelican, and heron colonies that are more accessible to centers of human population.

During the summer, 191 species and subspecies were noted. No general collecting was done but a definite effort was made: (1) to collect an adequate number of specimens of such variable species as the Song Sparrow, Fox Sparrow, Savannah Sparrow, and Winter Wren

to give a clear idea of their distribution, and (2) so far as limited collecting could achieve it, to fill the gaps in our knowledge of the forms inhabiting certain Aleutian and other islands. In doing this I was greatly assisted by several members of the party who frequently collected the desired material while I was busy with other duties. Frank Dufresne and H. Douglas Gray were particularly helpful, and they as well as others aided in the task of caring for the specimens—one that was sometimes rather trying after a full day's work in other fields.

LOG OF THE TRIP

Travel was by commercial steamer from Seattle to Petersburg, Alaska. At that point we boarded the Biological Survey boat, the 'Brown Bear,' on June 4. This sturdy 114-foot craft remained our home from that time until we left it in Bristol Bay on July 19. The following brief log will give an idea of the opportunities for observing birds.

June 3.—Steamer 'Alaska.' Approached Ketchikan in the early morning. Ashore here and at Wrangell for short stops, and boarded the 'Brown Bear' at Petersburg at 12:30 A. M. on June 4.

June 4.—Spent morning at Petersburg and on the fur farm some six miles away. Left Petersburg after lunch and stopped on Portage Bay, Kupreanof Island, for a couple of hours tramp through the forest in the evening. Arrived at Juneau during the night.

June 5 and 6.—Juneau. Visited Eagle River area and Mendenhall Glacier.

June 7.—Awoke at the entrance to Glacier Bay. Spent much of the morning there, going ashore at two places for a short time. Bay full of scattered birds. In the afternoon passed Cape Spencer and around northwest along Fairweather Range but some five miles off shore. Many birds.

June 8.—Approaching Yakutat in the early morning, had a wonderful view of the mighty St. Elias range and Malaspina glacier. Spent the day ashore at Yakutat. Went by Yakutat and Southern Railway nine miles to Situk river where a salmon weir is located. Frank Dufresne and I walked most of the way back in the late afternoon. Railway passes through some timber and much tundra. Left Yakutat at 11 P. M.

June 9.—Yakutat to Cordova across Gulf of Alaska. Birds few.

June 10.—Arrived in Cordova during night. Spent the day on Copper River flats with Clarence Rhode (Alaska game agent) in a speed boat visiting the fishing area and observing birds. Left Cordova about 11:30 P. M.

June 11.—Through Prince William Sound, arriving at Seward just after lunch. By auto to Coopers Landing on Kenai River where we spent the night. Had an opportunity for a short hike in evening.

June 12.—Climbed a mountain with Grenold Collins (Alaska game agent) to look over the country and returned to the 'Brown Bear' at Seward in the evening. Left Seward at 11 P. M.

June 13.—En route to Kodiak. Stopped on East Amatuli Island in the Barren Island group for a couple of hours and then proceeded to Kodiak, arriving in the

night. Many fulmars and petrels about in the evening as we approached the north end of Afognak Island.

June 14.—Ashore at Kodiak and at the new Naval Base.

June 15.—Visited Whale Island and Afognak Island. On the latter island hiked up Litnik River to see the site and buildings of abandoned fish hatchery.

June 16.—Left Kodiak at 7:30 A. M. Visited Whale Island and a small unnamed island, and arrived at Port O'Brien on the northwest side of Kodiak at 8 P. M.

June 17.—Left Port O'Brien at 5 A. M. Visited Karluk and took a combination motor boat and walking trip to a weir on Karluk River. Reached Larsen's Bay at 5 P. M. and climbed a peak just back of the salmon cannery, hoping to see some of the big Kodiak bears. No luck, although some of the animals had been seen from the cannery a few hours before.

June 18.—Left Larsen's Bay at midnight and arrived at Semidi Islands at 3:40 P. M. Tried to land on Aghiyuk Island, the northernmost big island, but heavy surf prevented. Landed on Choweit Island and spent the remainder of the day there and in circling smaller islands. Traveled in the night to the mainland.

June 19.—Spent morning in Chignik Bay. Short walk ashore after visiting floating cannery. Left at noon. Landed for a short time in the afternoon on Metrofania, a very rugged island just offshore.

June 20.—Arrived at Sand Point in Shumagin group at 5 A. M. in heavy rain and wind. Spent most of day in the canneries there but pulled around to Dolgoi Bay in the later afternoon to meet the Fisheries boat, 'Crane.' Many birds noted on the latter trip.

June 21.—Arrived at King Cove, 7:30 A. M. Spent three hours ashore and then sailed around to Morzhovoi Bay arriving at 2 P. M. Spent the remainder of the day ashore about a lagoon and on Frosty Peak to the eastward, returning to the boat at midnight. Most interesting day of the trip to date.

June 22.—Ashore at False Pass much of the morning; en route to Akutan the balance of the day.

June 23.—Up at 4 A. M. to visit the Tufted Puffin colony on Bereskin Island; also ashore at Akutan for several hours, and arrived at Unalaska at 5:30 P. M. Great masses of Fulmars with some shearwaters in Akutan Pass.

June 24.—Enroute to Bogoslof Island. Spent many hours ashore there.

June 25.—Ashore at Chagulak Island in the Aleutians in the morning and on Amukta Island in the afternoon.

June 26.—Ashore at Atka village in the morning and Kasatochi Island in the late afternoon.

June 27.—Ashore at Tanaga Island in the morning and Ogliuga Island in the afternoon.

June 28.—Arrived at Amchitka Island in a heavy blow but managed to get ashore and spent the day with the men on the sea otter patrol. Walked across the island to their overnight cabin and back.

June 29.—Worst blow of the trip prevented landing on Gareloi Island.

June 30.—Landed on the west side of Atka Island and walked across to Atka village while the 'Brown Bear' went around to meet us.

July 1.—Ashore at Carlisle and Kagamil islands.

July 2.—In Unalaska most of the day while the 'Brown Bear' took on oil, water, and supplies. Sailed for the Pribilof Islands at 5 P. M.

July 3.—Ashore at St. George Island from 2 P. M. to 1 A. M. The last fifty miles

coming in, we traveled through increasingly dense concentrations of birds on the water. I believe this island harbors by far the greatest bird population of any visited on the trip.

July 4, 5 and 6.—Ashore, St. Paul Island.

July 7.—Ashore, Walrus Island in morning; en route to St. Matthew Island remainder of the day.

July 8.—Ashore, St. Matthew Island most of the day.

July 9.—Trip to Pinnacle Rock and ashore on St. Matthew Island in the afternoon.

July 10.—En route most of day. Ashore on northwest point of Nunivak Island in later afternoon and evening.

July 11.—Ashore at Eskimo village at Cape Etolin all day.

July 12.—On account of a strong wind we spent the day anchored in the lee of Cape Vancouver on Nelson Island instead of visiting goose nesting islands as we had planned. Did get ashore for a time on Nelson Island.

July 13 and 14.—En route to Bristol Bay.

July 15 to 17.—'Out of circulation' with streptococcic sore throat. In the afternoon of July 17, Dufresne and I drove around over the few miles of road there or near Dillingham.

July 18 to 22.—By boat and plane about Bristol Bay and on salmon spawning surveys of the streams and lakes tributary to it. An excellent opportunity to make bird notes as we often flew low enough to identify birds and alighted frequently. We covered many hundreds of square miles and saw literally thousands of lakes and ponds. Nearly every one had some waterfowl, but from the plane many of the birds could not be identified; hence the notes on the species for this locality will give a totally inadequate picture of the huge number of waterfowl actually present. Assuming that the species identified—the Mallard, Pintail, Green-winged Teal, and Greater Scaup Duck, abundant in that order—made up the bulk of those present, the total number of breeding pairs of these species in this area is enormous.

July 23 and 24.—Up Kvichak River and Iliamna Lake in a speed boat.

July 25.—On Iliamna Lake.

July 26.—Flying over salmon-spawning area in streams and lakes tributary to Iliamna Lake.

July 27.—By speed boat up Iliamna Lake; walked across the portage to Cook Inlet, and boarded Fisheries boat, 'Teal.'

July 28.—Ashore at Chisek and Kalgin islands. Visited Kenai village and anchored at night at the mouth of Kasilof River.

July 29.—Up Kasilof River and Tustamina Lake in a river boat.

July 30 and 31.—In moose country between Tustamina Lake and Kenai River, flying to Anchorage in the afternoon of July 31.

August 1.—In Anchorage and Matanuska.

August 2.—Left Anchorage by rail. Arrived in Mt. McKinley Park at 2:30 P. M. Spent the balance of the day in the park.

August 3.—In Mt. McKinley Park.

August 4.—By rail to Fairbanks.

August 5.—In Fairbanks.

August 6 and 7.—Along Steese Highway between Fairbanks and Circle.

August 8 and 9.—Along Richardson Highway between Fairbanks and Valdez. Boarded the 'Brown Bear.'

August 10.—In Cordova.

August 11 and 12.—Cordova to Sitka, via 'Brown Bear.'

August 13.—Little Port Walter and on into Juneau.

This was the last day of the trip on which it was possible to make observations on birds.

LIST OF SPECIES

COMMON LOON, *Gavia immer immer* (Brünnich).—This large loon was not common. A single individual on a little lake near Kenai Lake (June 11), another on a small lake back of the cabin on Amchitka Island (June 28), and a pair with one young on a lake near the cannery at the mouth of Egigik River (July 21), were all that were seen except for one day on the Kvichak River. Here on the 90-mile trip from Bristol Bay up the river to the foot of Iliamna Lake (July 23) both this species and the Pacific Loon were common. We saw them in pairs at intervals throughout the day. The Pacific Loon was the more abundant, but we noted at least a dozen pairs of the present species. The tundra along the river was dotted with lakes and ponds on which the loons settled after we flushed them from the stream.

YELLOW-BILLED LOON, *Gavia adamsi* (Gray).—A single individual noted just outside of the entrance to Portage Bay, Kupreanof Island (June 4), was the only bird of this species seen although a sharp watch was kept for it. The straw-colored bill was very conspicuous even at a distance.

PACIFIC LOON, *Gavia artica pacifica* (Lawrence).—By far the most abundant loon noted. It was first observed on Glacier Bay (June 7) when a pair in high plumage was watched for a time. In addition to scattered individuals, we saw perhaps thirty pairs or more on the Kvichak River (July 23). One pair was very much in evidence at the Iliamna Lodge, which was our headquarters from July 24 to 26. Always one or both of the birds could be seen fishing in the shallow waters and conducting a busy fish-ferry service to some lake back on the tundra. Another pair behaved precisely the same while we were anchored in the mouth of Kenai River (July 28).

I had always considered that the Common Loons were noisy enough, but these Pacific Loons were much more vocal. Usually they started calling when leaving the water and kept it up for some distance. This was especially noticeable when any one of the two pairs engaged in the fish-ferry business succeeded in making a catch. As they left on the inland trip, a harsh triumphant cry announced the departure.

RED-THROATED LOON, *Gavia stellata* (Pontoppidan).—We saw this species in only three localities, all in southeastern Alaska. Two individuals were seen in Portage Bay (June 4), six on a small bay in

Lynn Canal about twelve miles out of Juneau (June 5), and a single bird in high spring plumage on Glacier Bay (June 7).

HOLBOELL'S GREBE, *Colymbus grisegena holboelli* (Reinhardt).—A single male in high plumage on Glacier Bay (June 7) provided the only record for the summer.

HORNED GREBE, *Colymbus auritus* Linnaeus.—Two birds in Mt. McKinley National Park (August 3) and a number of individuals scattered on small lakes between Paxton and Valdez along the Richardson Highway were the only Horned Grebes seen. On one of the lakes mentioned, at least a dozen of these beautiful little grebes fed about the water plants totally unaware that we were watching them through the screen of low spruce and willow that bordered the lake.

[PIED-BILLED GREBE, *Podilymbus podiceps podiceps* (Linnaeus).—On August 3, I saw three birds on a lake near Fairbanks which I was certain were of this species. I was aware of the lack of Alaskan records and watched these individuals for a long time, trying to make something else of them. They certainly were not Horned Grebes, and if seen at a distance under the same circumstances farther south would have been recorded as Pied-bills. I am giving the record for what it may be worth.]

BLACK-FOOTED ALBATROSS, *Diomedea nigripes* Audubon.—We first sighted these master mariners while crossing the Gulf of Alaska (June 9). They accompanied us all the way with as many as fifteen in sight at once. One never tires of watching their evolutions and the ease with which they seem to take advantage of even the minor air disturbances accompanying the rolling of small waves. I spent hours on deck trying to coax them close enough for good photographs.

As we lay off Bogoslof Island (June 24) waiting for the fog to lift, four of these birds settled near the boat and swam about it unconcernedly as if they were domestic ducks. We did not see any of them during our Aleutian trip although Gray says they are of frequent occurrence about the islands. On the return trip across the Gulf of Alaska (August 11 and 12), five Black-footed Albatrosses were our constant companions, following us almost to Sitka. A few others were noted on August 11 among a great swarm of Pacific Fulmars clustered about a very large and very dead whale.

SHORT-TAILED ALBATROSS, *Diomedea albatrus* Pallas.—A single individual followed the 'Brown Bear' for about half an hour as we were crossing the Gulf of Alaska (June 9).

SLENDER-BILLED SHEARWATER, *Puffinus tenuirostris* (Temminck).—We saw a few shearwaters from time to time but did not encounter

any of the great swarms that sometimes frequent the Aleutians. We saw them in the Gulf of Alaska (June 9), in Akutan Pass (June 23), and at Atka (June 27). The 'Brown Bear' returned to the Aleutian Island patrol after leaving us at Bristol Bay and ran into innumerable shearwaters in Unimak Pass on July 22. Gray collected four which proved to belong to this form.

PACIFIC FULMAR, *Fulmarus glacialis rodgersi* Cassin.—We sighted the first Pacific Fulmars as we crossed the Gulf of Alaska (June 9). There were two white birds among them. Between the Barren Islands and Afognak we passed through a moderately large concentration of these birds, some on the water and others flying.

The Semidi Islands Refuge, which embraces two fairly large islands and numerous smaller ones, proved to be the home of an enormous colony of this species. I am unable to say whether this colony or the one on St. Matthew Island is the larger, but I am sure that both exceeded any I saw in the Aleutians. Gray, who has visited colonies in the latter refuge which I did not see, was also inclined to believe that the Semidi Islands colony is larger than any of those on the Aleutians.

In the Semidis, there were two huge colonies on Chowiet, one of the larger islands, and considerable colonies on Ageak and Kateekuk among the smaller islets. We did not have time to do the sounding necessary for safe approach to the other islands, but our glasses revealed swarms of fulmars above the cliffs on Anowik, Kikiktagik, and Saklik, and on the southwestern corner of Aghiyuk, the northernmost of the two larger islands.

These swarms were acting precisely as did those we were then viewing at close range and undoubtedly were from other colonies. By careful maneuvering we were able to see into some of the nests on the high cliffs on the northwestern corner of Chowiet. They contained eggs but no young. In Akutan Pass (June 23) we passed through another vast flock of this species, mixed with shearwaters and other birds, but did not find any colony in the vicinity, nor did Gray know of any.

We visited the fulmar rookery on Chagulak Island on June 25. This is a very steep island, being nothing more than a sheer mountain top projecting above the water. By working carefully up the slopes, I succeeded in getting within a few feet of many sitting birds—each with a single white egg. I soon discovered that a few feet was close enough. Closer approach resulted in the ejection from the mouth of the bird of a thin stream of an oily and rather evil-smelling liquid which traveled with considerable force a distance of eighteen inches or more.

Along the north side of Atka Island (June 26) we passed through another great swarm of these birds—sure indication at this season that we were near another colony. Another concentration at the entrance to Tanaga Bay (June 27) probably came from some of the smaller islands nearby.

As we approached the southern end of St. Matthew Island (June 8), we met increasing numbers of these birds until the water and air seemed filled with them. We saw that the perpendicular cliffs about the bases of the three peaks which form that end of the island were literally covered with birds, a great proportion of which proved to be fulmars. In numbers this colony rivals, if it does not exceed, the combined aggregations on the Semidis. We took a small boat and cruised for a mile or more along the estimated four to five miles of fulmar colony. The cliffs were festooned with birds, with every available niche and ledge crowded. For the two days we were about this island we were never out of sight of swarms of fulmars.

It was interesting to note the distribution of the gray and white phases of these birds. In the concentration between the Barren Islands and Afognak there were very few white birds. The same was true in the Semidis. On Chagulak Island and along the Aleutians, gray birds predominated but white ones were more numerous than in the more southern localities. On one ledge I closely observed seven sitting birds, three of which were white, and while I watched this and nearby groups the mates who came to join them were of the same colors as the sitting birds. I did not see a white bird feed a gray one or vice versa.

On St. Matthew Island, so far as I could see, all of the birds were white. I looked for two days for a gray bird and failed to find one, although there could have been a sprinkling of them without my being lucky enough to pick them out among the swarming thousands about the faces of the cliffs. These observations prove nothing but they did occasion some speculation as to the distinctness of the two forms of the species.

FORKED-TAILED PETREL, *Oceanodroma furcata* (Gmelin).—In view of the known colonies along the Alaska coast, we did not see as many of these birds as might have been expected. Numbers of them flew about the boat on June 13 between the Barren Islands and Afognak Island. Among them was one dark-bodied bird that came fairly close to the boat several times but which could not be certainly identified. It was probably Leach's Petrel (*O. l. leucorhoa*). On August 11 a number of Forked-tailed Petrels were noted in a great swarm of birds about a dead whale in the Gulf of Alaska.

The party visited only one colony, that on Amukta Island in the Aleutians. Here an old and well-weathered lava flow, overgrown with moss, lichens, and other low vegetation, contained a good-sized warren. We dug out one bird that was sitting on its single white egg, heard many others in the rocky crevices, and detected the characteristic musky odor of these birds at many of the openings.

WHITE-CRESTED CORMORANT, *Phalacrocorax auritus cincinatus* (Brandt).—Many cormorants were sighted at a distance but not specifically identified. Cormorants were never present in such enormous numbers as were some of the other sea birds, but we seldom approached small rocky pinnacles or the sheer cliffs of the larger islands without sighting a few of them. The White-crested Cormorant was not abundant anywhere, being seen in largest numbers about Sitka and Little Port Walter, August 12 and 13, respectively, when several were observed. On other occasions this species was recognized only as single birds or groups of two to four that passed near enough the boat to be certainly identified. They were so noted from Cordova west along the Alaska peninsula and in Bristol Bay.

Much to my surprise, a small cormorant colony of perhaps a dozen pairs, established in a shallow cave on Carlisle Island in the Aleutian chain, was about equally populated by the White-crested and the Pelagic cormorants. Both species had well-grown young in the nests.

PELAGIC CORMORANT, *Phalacrocorax pelagicus pelagicus* Pallas.—This was by far the most widely distributed cormorant observed during the trip. From June 7, when in Glacier Bay we noticed a minor iceberg decorated with a black necklace of these small, iridescent-plumaged cormorants, to St. Matthew Island's great rookeries where it was the only cormorant, we saw these birds about every rocky island and point.

RED-FACED CORMORANT, *Phalacrocorax urile* (Gmelin).—This small northern cormorant was most common on Bogoslof Island and the Pribilofs, but in neither place did its numbers approach those of the murres with which it was associated. The rocky shelves of the Bogoslof Island peaks and cliffs sheltered a probable total of several hundred nesting pairs which, on June 24, had no young in the nests into which we could see.

This species was much more numerous in the Pribilof Islands. We visited two small nesting colonies on St. Paul Island on July 6 but could not inspect them closely from the base of the cliffs. On Walrus Island I had an opportunity to see numerous nests, only one of which contained eggs. The others held from two to five nestlings each,

varying from the leathery-looking, newly-hatched young to those half grown or more.

NORTHWESTERN COAST HERON, *Ardea herodias fannini* Chapman.—This, the only member of the heron family seen on the trip, was observed on three different days in four localities, as follows: June 4, two birds at Petersburg and one at Portage Bay; June 5, one at Juneau; and August 13, one at Little Port Walter on our return from the west. Somehow this last observation of this long-legged fisherman brought a sudden realization that we were returning to more familiar things and that our Alaskan trip of high ornithological adventure was nearly ended.

WHISTLING SWAN, *Cygnus columbianus* (Ord).—Although I was told that a few swans were spending the summer on the Copper River Flats near Cordova, we did not find the birds on the only day that we could spend in this interesting area.

About Bristol Bay this was a common nesting species in the little lakes that dotted the tundra. The first we saw were noted from a small plane while crossing over the tundra between Naknek Lake and Bristol Bay on July 19. On July 21, while flying over the vast extent of tundra that lies to the south of Bristol Bay, a great many pairs of swans were noted. On numerous occasions we counted from one to three small cygnets with the adults. Later we flew over the country north of Iliamna Lake, particularly Lake Clark and its tributaries. While flying along the largest of these, the Chulitna, numerous pairs of swans with from one to four young each were noted in the lakes well toward the headwaters of that stream.

WHITE-CHEEKED GOOSE, *Branta canadensis occidentalis* (Baird).—This big, dark-colored goose was first noted at Petersburg on June 4 when a mated pair and five other birds were seen. The next day, at Juneau, flocks of seven and twenty-six were noted near the mouth of Eagle River. Several hundred geese of the *canadensis* group were seen during the day spent on Copper River Flats (June 10). They included several mated pairs and numerous small flocks. Most of these birds were obviously one of the smaller and paler subspecies (probably *B. c. leucopareia*) although among them were several large and dark birds that seemed to be the White-cheeked Goose. One nest containing eight eggs, belonging to one of these smaller pairs was found by flushing the sitting bird.

WHITE-FRONTED GOOSE, *Anser albifrons albifrons* (Scopoli).—Five adult White-fronted Geese were noted on the Copper River Flats on June 10. The species was not recorded again until on July 21 when

several pairs, with what seemed to be well-grown young, were observed from the air near Becharof Lake. I could not be certain of the identity of these geese but local men assured me that the White-fronted Goose was the common nesting species of the tundra about Bristol Bay. I saw three pairs on the Kvichak River on July 23 and estimated 500 in one large and several smaller flocks along the Chulitna River on July 26. Among the latter were several groups of from four to six birds which we approached closely since they were unable to fly.

COMMON MALLARD, *Anas platyrhynchos platyrhynchos* Linnaeus.—The Mallard was the most common and widely distributed "puddle" duck. In the first marshes visited, those of the Copper River Flats (June 10) we saw many scattered pairs; one female with eleven young about ten days old was followed for some distance along one of the salt-water channels of this area. A single drake was noted flying along the shore of East Amatuli Island (Barren Islands) on June 13—certainly an odd place for a Mallard.

Many dozens of broods of ducks seen from planes and boats about Bristol Bay could not be identified. However, when we were flying low in good light conditions or when we landed on some of the small lakes, broods of Mallards were recognized more often than any other species.

GADWALL, *Chaulelasmus streperus* (Linnaeus).—Gadwalls were observed only on June 10 on the Copper River Flats. I watched two at close range for a time and saw several other individuals on the wing. I was surprised to find them, but was told that Gadwalls are more or less regular visitors to this area.

BALDPATE, *Mareca americana* (Gmelin).—A flock of fifteen birds was noted on the Copper River Flats on June 10. This was the only definite record although in the Bristol Bay area from the planes I several times saw birds that I was reasonably sure were Baldpates.

AMERICAN PINTAIL, *Dafila acuta tzitzihoa* (Vieillot).—This species ranked second to the Mallard in abundance among shoal-water ducks. Pintails were common on the Copper River Flats (June 10), being outnumbered in this area only by the Shoveller and the Mallard. None was seen following this until a single female was noted on the Naknek River (July 19). During the trip up the Kvichak River (July 23) numerous individuals were seen in marshy spots along the banks, some of them females, doubtless with families somewhere in the grass. One bird in particular circled our boat several times at close range, obviously to distract our attention from a bit of marsh near which we happened to stop for a few minutes.

On one little lake in the park (August 3) I noted a female scaup leading a brood of nine young and, bringing up the rear, a Pintail hen that was as constant in her attentions as the real mother. There was a single duckling about two or three days old swimming about the pond peeping constantly without receiving any attention from any adult. When captured it proved to be a downy Pintail. This pond was watched for some time, and except for the hen Pintail and the scaups, it sheltered only a pair of Old-squaws with two young. It appeared that the Pintail had left her own baby to shift for itself while she helped her scaup neighbor care for a much larger family.

EUROPEAN TEAL, *Nettion crecca* (Linnaeus).—This Old-World relative of our Green-winged Teal was first seen on Amukta Island (June 25), when a pair was flushed from a tiny pond on the beach just above the high-tide mark. In action, flight, and general appearance they were much like our species. Two males were watched at short range for some time on Tanaga Island (June 27). The lack of a white crescent in front of the wing is very evident and provides a good field-identification mark when the birds are at rest. On the afternoon of the same day, on Ogliuga Island, I saw ten of these little ducks and found one hen with a single newly-hatched young following her. These birds were in pairs or trios in the sheltered salt-water bays and lagoons or in the tide pools among the rocks. About a dozen were noted in different ponds on Amchitka Island (June 28) in the course of a walk across the island and back. A single bird on a small tidewater pool on Atka Island (June 30) was the last bird of the species noted on the trip.

GREEN-WINGED TEAL, *Nettion carolinense* (Gmelin).—While this was one of the more numerous river ducks noted during the summer, it was seen only at Cordova (June 10) on the Copper River Flats, where three males were observed, until July 23, after our return to the Alaskan mainland. Here, along the Kvichak River, it was common. Included among those seen there were a number of females, obviously attempting to toll us away from young hidden in marshy spots along the stream. On July 29, the Green-winged Teal was the most abundant duck along the Kasilof River. Many of the groups apparently consisted of a female and her newly-fledged young.

SHOVELLER, *Spatula clypeata* (Linnaeus).—The Shovellers were the most conspicuous, if not the most abundant, ducks on the Copper River Flats (June 10). They were flushed from numerous points or from little pools along the narrow channel as our speedboat roared past. Perhaps it was because they allowed a closer approach that

they were so much more noticeable than other species. A male and female seen on an island in the big lagoon at the north end of Morzhovoi Bay were the only other Shovellers noted during the summer.

RING-NECKED DUCK, *Nyroca collaris* (Donovan).—A single high-plumaged male Ring-neck was watched at close range on a little lake on the summit of the road from Seward to Hope on the Kenai Peninsula on June 11. I was surprised to see a duck of this species so far from its established breeding range and therefore made certain of its identity before recording it in my notes.

GREATER SCAUP DUCK, *Nyroca marila* (Linnaeus).—I am listing here all the scaups noted on the trip although there may have been a few of the Lesser Scaup Duck intermingled. Scaups were common breeding birds about Bristol Bay and in Mt. McKinley Park.

There were several fair-sized flocks on Copper River Flats on June 10. The species was not positively identified again until July 23 on the Kvichak River, although some of the numerous unidentified ducks, especially on Amchitka Island, were thought to be scaups. Poor visibility made it impossible to be certain of identifications at all times.

During the ninety-mile trip up the Kvichak four broods of one, three, three, and four scaups, from newly-hatched to half-grown, were noted. In addition, many adults, unaccompanied by young, were seen at intervals along the stream. Several broods were noted along the Chulitna River (July 26) and it is a fair assumption that a good proportion of the more than fifty duck families seen from the plane that morning, but not identified, were of this species. In McKinley National Park, females with broods of ten and seven each were noted on August 2, and three broods, of ten, nine, and one, respectively, were observed in the same area on August 3.

AMERICAN GOLDEN-EYE, *Glaucionetta clangula americana* (Bonaparte).—A single bird industriously feeding about the piling of the dock at Juneau (June 5) directly behind our boat was the only one of this species definitely recorded.

BARROW'S GOLDEN-EYE, *Glaucionetta islandica* (Gmelin).—Frank Dufresne took two downy ducklings of this species from two Indian boys at Yakutat on June 8. The boys said they found them but had not seen their mother. Two birds were watched for a time in a little pond along the Richardson Highway near Paxton on August 8.

BUFFLE-HEAD, *Charitonetta albeola* (Linnaeus).—A female in Glacier Bay (June 7) was the only Buffle-head recorded during the summer.

OLD-SQUAW, *Clangula hyemalis* (Linnaeus).—Old-squaws were not noted until July 8 when we reached St. Matthew Island. They were

fairly common about the larger lakes and lagoons of the tundra. We hunted for nests but without success in the short time available. These birds were equally common on Nunivak Island on July 11 but were not again seen until August 3 when four adults and one female with two downy young were found on two of the numerous small lakes that adjoined the McKinley Park road.

WESTERN HARLEQUIN DUCK, *Histrionicus histrionicus pacificus* Brooks.—This beautifully marked duck was widely distributed along the rocky coast and islands but was never abundant. Twice both sexes were seen flying up and down swift mountain streams, the first time on Kenai River and Russian River (June 11), and the second, near the falls of Kittiwake Creek between Brooks and Naknek lakes (July 19).

During the remainder of the summer the Harlequin was frequently seen on coastal waters in groups of two or three to upwards of a hundred. In June, flocks of both sexes were frequently noted; the largest flock was one of more than a hundred birds on Kodiak Island (July 16). Through July bands of ten to seventy-five of the brightly marked males were observed, but the only flock of females seen was one of fifteen birds at St. Matthew Island on July 9.

STELLER'S EIDER, *Polysticta stelleri* (Pallas).—Two adult males of this beautiful little eider were noted on Morzhovoi Bay on June 21, and one was collected. This bird was very thin and definitely indicated as non-breeding by the condition of the sex organs.

PACIFIC EIDER, *Somateria v-nigra* Gray.—Like the Harlequins, the Pacific Eiders were not often so abundant as to stand out in the great hordes of birds present in Alaskan waters, but they were widely distributed and were seen at most stops from the time we observed a dozen at the new naval base on Kodiak (June 14) until we reached Bristol Bay on July 14. One nest with five eggs was found on the Semidi Islands (June 18) and some forty adults were present in the little bay where we landed on Choweit Island. A second nest with five eggs was discovered on Amukta Island (June 25). On a single little rocky point on Tanaga Island I found eight eider nests, six with five eggs each, one with six eggs, and one with one egg in the nest and two eggs that were stone cold in the grass outside. On Nunivak Island (July 10) a female with five young was noted.

WHITE-WINGED SCOTER, *Melanitta deglandi* (Bonaparte).—This scoter was not common. About a dozen were noted at Petersburg (June 4) and the species was one of the most numerous of those observed on Glacier Bay (June 7). A few birds were in the harbor at Yakutat

(June 8) and about a hundred were seen in the straits between Kodiak and Afognak Island (June 16). A small flock was seen on the northwest corner of Nelson Island (July 12).

SURF SCOTER, *Melanitta perspicillata* (Linnaeus).—The Surf Scoter was less common than the preceding species. Two were seen at Petersburg (June 4), two males were found at Portage Bay the same day, and four old males were flushed by our boat on the Kvichak River on July 23. Charles E. Jackson found a downy young of this species dead on the shore of Lynx Lake (north of Bristol Bay) and brought it to me on July 17.

AMERICAN SCOTER, *Oidemia americana* Swainson.—The American Scoter was found breeding on a number of ponds about Bristol Bay and in Mt. McKinley National Park. The first family positively identified comprised a female accompanied by three newly-hatched young on a little lake at Egigik (July 19). Three females with broods of one, three, and four, respectively, were seen along the Kvichak (July 23), and three broods of one, three, and seven young on small lakes in Mt. McKinley Park (August 3). In addition, adults, but no young, were seen along the Naknek River on July 19 and they were common along the Kvichak River throughout the trip.

A female fed about the dock at Iliamna Lodge daily from July 24 to 26 during our stay there.

AMERICAN MERGANSER, *Mergus merganser americanus* Cassin.—Many female mergansers were seen that could not be satisfactorily identified, some of them with young. Those on the Alaska peninsula and in the vicinity of Bristol Bay that were collected or could be otherwise named with certainty proved to belong to the next species. Three birds seen from the train on the Susitna River near Curry on August 2 were American Mergansers, and possibly some of those observed on the Kenai River on June 11 were of this species although the only males noted on the latter stream were Red-breasted Mergansers.

RED-BREASTED MERGANSER, *Mergus serrator* Linnaeus.—This fish-duck was first noted on the Kenai River (June 11) where several individuals were seen. The first broods of young were seen on July 18 on Wood River. In the next few days, many mergansers, including numerous broods of young varying in size from those newly hatched to others nearly half grown, were seen on the lakes and streams tributary to Bristol Bay. Over fifty broods of young mergansers were noted on the Kvichak River on July 23. There was one female with two young, and another with four; but others had done much better, and had broods ranging from seven to twelve in

number. Single birds collected out of these broods in three cases proved to be of this species.

SHARP-SHINNED HAWK, *Accipiter velox velox* (Wilson).—Hawks of all species were surprisingly rare. I had hoped to find at least some forms reasonably abundant but was disappointed. Single individuals of this species were seen on Tustamina Lake (July 30) and along the Richardson Highway south of Fairbanks (August 8).

WESTERN RED-TAILED HAWK, *Buteo borealis calurus* Cassin.—Single birds were seen along the Kasilof River (July 29) and the north shore of Tustamina Lake (July 31). Two were observed in Mt. McKinley Park (August 2), and a number along the Alaska Railroad between the Park and Fairbanks on August 4. Four were identified along the Steese Highway on August 6, including one collected on the banks of the Yukon at Circle.

AMERICAN ROUGH-LEGGED HAWK, *Buteo lagopus s.johannis* (Gmelin). —A very ragged-looking bird on Kodiak (June 14) provided the first record of this species. No other rough-leg was seen until July 17 when another single bird was observed near Dillingham. Several were identified along the Steese Highway (August 6) and the species was fairly common along the Richardson Highway (August 8–9).

NORTHERN BALD EAGLE, *Haliaeetus leucocephalus alascanus* Townsend.—Bald eagles were not as common as I had expected to find them in view of the stories of their reputed abundance and destructiveness. We had almost ideal opportunity to watch for them from the boat. We saw them nearly every day from the time we embarked at Petersburg (June 4) until we left the Aleutians on July 2. We did not see them again until our arrival at Bristol Bay on July 17 but saw them commonly again from that date whenever we were along the coast. The greatest number observed in one day was ten along the Kvichak River (July 23). Six were noted on each of two days at Cordova (June 1) and Mt. McKinley Park (August 2). This last record was the only one for the species away from the coast. From one to four birds a day was the usual quota.

MARSH HAWK, *Circus hudsonius* (Linnaeus).—A number of Marsh Hawks were seen from the train between Mt. McKinley Park and Fairbanks (August 4) and two on open lands along the Steese Highway on August 6.

OSPREY, *Pandion haliaëtus carolinensis* (Gmelin).—Single birds were seen on each of four days at the following places, all in the Bristol Bay district: Wood River (July 18), Brooks Lake (July 19), Iliamna Lake (July 25), and Chulitna River (July 26).

PEALE'S FALCON, *Falco peregrinus pealei* Ridgway.—One bird on Chagulak (June 25) and three on Kasatochi (June 26) provided the only records for the trip.

WESTERN PIGEON HAWK, *Falco columbarius bendirei* Swann.—This was the most common hawk in the interior. Eight were seen on August 2 in Mt. McKinley Park and the same number on the Steese Highway (August 6). It was also observed from the train on August 4 between the Park and Fairbanks and a total of five was recorded on the trip down the Richardson Highway (August 8–9).

EASTERN SPARROW HAWK, *Falco sparverius sparverius* Linnaeus.—This little hawk was seen only twice—the first time in Mt. McKinley Park (August 2) and the second time along the Steese Highway (August 6).

SITKA GROUSE, *Dendragapus fuliginosus sitkensis* Swarth.—Two hens, one with one chick and one with five, were seen near Petersburg (June 4); four male birds were heard hooting and one was seen on Portage Bay the same evening.

ALASKA SPRUCE GROUSE, *Canachites canadensis osgoodi* Bishop.—Three Spruce Grouse were seen along the Susitna (August 2) and ten noted near Circle Hot Springs along the Steese Highway (August 6). One was collected.

VALDEZ SPRUCE GROUSE, *Canachites canadensis atratus* Grinnell.—A male was collected along Kenai River on June 11.

ALASKA PTARMIGAN, *Lagopus lagopus alascensis* Swarth.—Two broods of Willow Ptarmigans, each containing about eight birds, were noted along the Susitna River (August 2). On the next day, seven coveys were noted in Mt. McKinley Park. Of these, two contained ten birds each (in each case two adults and eight young), and one had two adults and seven young. In four cases, only the female was present with well-grown young to the number of three, four, five, and six, respectively. Three birds collected were found to be referable to this subspecies.

ALEXANDER'S PTARMIGAN, *Lagopus lagopus alexandrae* Grinnell.—While ptarmigans were not plentiful, local residents, as well as representatives of the Alaska Game Commission, reported the population to be increasing again after the last 'low' in the cycle. A single male referable to this form, collected on a high peak near Kenai Lake (June 12), was the only individual seen on the Kenai Peninsula. Three birds were taken out of a flock on the shores of Iliamna Lake by Dufresne on July 25.

NELSON'S PTARMIGAN, *Lagopus rupestris nelsoni* Stejneger.—A single

male collected on Frosty Peak near Morzhovoi Bay (June 21) belongs here. It was one of two birds seen. H. D. Gray, who went back to Dutch Harbor with the 'Brown Bear,' collected three Nelson's Ptarmigans on Amaknak Island (July 27). Two birds from Mt. McKinley Park (August 3) seem to be intermediates between this form and *dixoni*.

TURNER'S PTARMIGAN, *Lagopus rupestris atkhensis* Turner.—A nest containing eight eggs was found at Atka Island on June 30. It was well concealed by the huge leaves of the wild parsnip that is found abundantly throughout these islands. Five adult birds were seen during a 'hike' across the island on which two were collected.

TOWNSEND'S PTARMIGAN, *Lagopus rupestris townsendi* Elliot.—A special effort was made to obtain ptarmigans on Amchitka Island but only two were seen and one taken (June 28). This single bird, a male in high plumage, is close to the form described from Kiska and may be placed with it, at least until more material is available.

RING-NECKED PHEASANT, *Phasianus colchicus torquatus* Gmelin.—The Alaska Game Commission has introduced these birds into various parts of the territory but it is yet too soon to determine the degree of success. They have nested and raised broods near Petersburg where we saw several birds on June 4.

LITTLE BROWN CRANE, *Grus canadensis canadensis* (Linnaeus).—A pair of cranes was seen and heard on St. Matthew Island on July 9. The birds were evidently nesting in a rather extensive mountain meadow near the north end of the island but time did not permit a successful search for the nest. On August 5, eleven cranes were sighted in a small field near the University of Alaska grounds at Fairbanks. While we watched them through field glasses, nine more flew in and joined them. Several times, a number of the birds indulged in a few steps of the dance that is usually seen in spring.

BLACK OYSTER-CATCHER, *Haematopus bachmani* Audubon.—We did not see this bird until June 13 at Barren Island, largely because we stayed well away from most of the rocky reefs. Oyster-catchers were noted as somewhat irregularly distributed from that point through the Aleutians as far west as we traveled. The greatest numbers seen were fifteen to twenty noted on the Semidi Islands and twelve counted in a mile along the rocky shores of Atka Island. When near, it was not easy to overlook these noisy birds, whose shrill calls cut clearly through the rumbling of the surf.

At Tanaga, six birds followed me as I walked along a rocky point jutting into Tanaga Bay. I suspect there might have been three nests there but I found only one, containing two newly hatched young

and one pipped egg. It was in the beach gravel but so near the vegetation that it was shaded by wild parsnip leaves.

SEMIPALMATED PLOVER, *Charadrius semipalmatus* Bonaparte.—Several Semipalmated Plovers, evidently migrants, were observed in Yakutat Bay and on the Situk River (June 8). A male and female about a little pool in the dunes on Morzhovoi Bay gave evidence of breeding as they were much disturbed by my presence. A single bird seen at a small pool at the edge of the snowfield on Frosty Peak later on the same day (June 21) acted in a similar fashion. A pair on Nunivak Island (July 10) was obviously nesting. The female had a curious modification of the injury-feigning reaction. She ran swiftly along, dragging her tail through the sand and calling incessantly. The resulting 'track' might have aroused considerable speculation if it had not been seen in the making. During the entire performance, which was repeated several times, the wings were kept folded in normal position.

RUDDY TURNSTONE, *Arenaria interpres morinella* (Linnaeus).—A single Ruddy Turnstone was seen on St. Paul Island (July 6) with a flock of Pribilof Sandpipers.

BLACK TURNSTONE, *Arenaria melanocephala* (Vigors).—The only Black Turnstones noted during the summer were seen on the Kvichak River (July 23). They were common along the entire ninety miles of stream traveled, usually in groups of four to six. All of them were feeding on the exposed bars and mud flats. At one cabin a number of birds were walking on split salmon on the drying racks apparently in search of flies. The people complained, however, that they also pecked holes in the fish.

WILSON'S SNIPE, *Capella delicata* (Ord.)—Two birds were seen near Dillingham on July 17.

BRISTLE-THIGHED CURLEW, *Phaeopus tahitiensis* (Gmelin).—A flock of twenty birds flushed from the bank and circled over our boat on the Kvichak River (July 23). Dufresne had seen a flock several times on the tundra back of the fisheries station at Naknek in the three previous days.

HUDSONIAN CURLEW, *Phaeopus hudsonicus* (Latham).—A single bird in Mt. McKinley Park (August 2) was the only one observed during the summer.

UPLAND PLOVER, *Bartramia longicauda* (Bechstein).—Several birds were seen about the shores of Wonder Lake in Mt. McKinley National Park on August 2 and 3. One pair, evidently nesting, perched anxiously on the tips of the scattered spruces, flying from one to another as we moved across the sloping tundra above the lake.

SPOTTED SANDPIPER, *Actitis macularia* (Linnaeus).—Spotted Sandpipers were common only on the Kenai Peninsula where a pair was noted on a little lake above Kenai Lake (June 11). They were common at the mouth of the Kenai River (July 28), along the Kasilof (July 29), and about Tustamina Lake (July 30–31). Except for these Kenai birds, 'teeter-tails' were noted only twice, the first time at Petersburg where a single bird was observed (June 4), and the second time along the Sustina River (August 2) when a number of birds were seen.

WANDERING TATTLER, *Heteroscelus incanus* (Gmelin).—Single tattlers were noted on three separate days. On July 24 and 26 a bird was seen each day on the shores of Iliamna Lake, and on August 3 a single young tattler with down still on its head was found in Mt. McKinley Park.

GREATER YELLOW-LEGS, *Totanus melanoleucus* (Gmelin).—Between Yakutat and the Situk River, Greater Yellow-legs were breeding on the tundra. There were at least ten pairs in the area we walked across. The birds sat on the tips of the scattered spruces or flew in circles about us. One pair resorted to 'dive-bombing' tactics so persistently that we knew a nest or young were near. These birds dived straight at our faces, sheering off just out of reach. We finally discovered the cause of their demonstrations in a long-legged and rather tired, fuzzy youngster running along some distance ahead of us between the rails of the Yakutat & Southern Railway.

The species was common on the Kenai and Alaska peninsulas.

LESSER YELLOW-LEGS, *Totanus flavipes* (Gmelin).—Lesser Yellow-legs were present in smaller numbers in the same bit of tundra near Yakutat where we found the preceding species. They behaved the same except that we found no young and experienced no 'dive bombing.' Three pairs were noted here and two pairs about bits of open swampy land along the Kenai River (June 11).

PRIBILOF SANDPIPER, *Arquatella ptilocnemis ptilocnemis* (Coues).—This sandpiper, which was one of the most abundant birds on St. George Island (July 3) and St. Paul (July 4–6), was even more conspicuous on St. Matthew (July 8–9). Two were seen and one collected on Nunivak (July 10). This bird was a juvenile with some of the down still visible about the head although it was able to fly well.

This species utters one of the most pleasing and melodious calls heard on the wetter tundras of its nesting islands. In some way these sandpipers reminded me of the Upland Plover; they had the same trick of whistling as they alighted with upraised wings. In the north in summer, they have little in common with the wintering Aleutian

Sandpipers of the Oregon coast in either habits or habitats. They are grassland birds and only once, on St. Paul Island (July 6), did I see them on the rocky beaches. On this occasion a group of a dozen, accompanied by a single Ruddy Turnstone, was observed. The breeding season seems to be rather extended. On St. Paul (July 5) I found a family of young fully feathered (except for the head and neck which were still downy). The next day Victor Scheffer brought in three downy young with their wing quills just started, and on the same day I found a nest with four fresh eggs. On St. Matthew, the Pribilof Sandpiper and McKay's Snow Bunting were the most common birds except for the inhabitants of the great seabird colonies. The Alaska Longspur was a poor third.

In contrast to the nearly related Aleutian Sandpiper, these birds were noticeably more rufous on the back and on the sides of the breast even at some distance. As we were on the breeding grounds of both forms within a week, we had an excellent chance to compare them.

ALEUTIAN SANDPIPER, *Arquatella ptilocnemis couesi* Ridgway.—Aleutian Sandpipers were exceedingly common in the tundra about the base and on the slopes of Frosty Peak in Morzhovoi Bay. They were more abundant there than at any place we happened to land in the Aleutians. In the latter group we found them on Tanaga (June 27), Amchitka (June 28), Atka (June 30), and Kagamil (July 1). They were most numerous on Amchitka and Kagamil. Their behavior was much like that of the preceding form.

PECTORAL SANDPIPER, *Pisobia melanotos* (Vieillot).—The Pectoral Sandpiper was noted only twice. Several were seen about a small pond on the northwestern part of Nunivak Island (July 10) and three individuals among a group of sandpipers on a bar in Kvichak River (July 23).

LEAST SANDPIPER, *Pisobia minutilla* (Vieillot).—A few Least Sandpipers were observed on the high meadows of Frosty Peak (June 21) and Becharof Lake (July 21).

RED-BACKED SANDPIPER, *Pelidna alpina sakhalina* (Vieillot).—Four birds about a group of little tundra pools on St. Matthew Island (July 8) acted as if they had nests.

LONG-BILLED DOWITCHER, *Limnodromus griseus scolopaceus* (Say).—Three males were taken from a flock of ten on the tundra near Yakutat (June 8).

SEMIPALMATED SANDPIPER, *Ereunetes pusillus* (Linnaeus).—This was the most common bird in the two areas visited on Nunivak Island

(July 10–11). The sandpipers were paired and though they were very much disturbed as we passed through their territories, no nests were found.

PACIFIC GODWIT, *Limosa lapponica baueri* Naumann.—Three were observed on the lagoon near the village on St. Paul Island (July 6).

RED PHALAROPE, *Phalaropus fulicarius* (Linnaeus).—A single bird in red plumage flew around the boat on June 9 as we were crossing the Gulf of Alaska.

NORTHERN PHALAROPE, *Lobipes lobatus* (Linnaeus).—This dainty phalarope was common on the Copper River Flats near Cordova (June 10). It was not seen again until July 8 on St. Matthew Island where twenty or more individuals were present about a group of small tundra lakes. One nest, a deep cup in the moss, containing four eggs, was found on a neck of land between two of these pools. Single pairs of birds were noted on Nunivak (July 10) and in Mt. McKinley Park (August 2).

PARASITIC JAEGER, *Stercorarius parasiticus* (Linnaeus).—The first Parasitic Jaegers observed were three pairs on the Copper River Flats near Cordova (June 10). A single bird flew about the boat in Larsen Bay on the west side of Kodiak Island (June 17). One pair was present on Choweit Island in the Semidis (June 18) and a single bird was observed in Tanaga Bay (June 27).

The species was not observed again until July 17, at Dillingham. The only day on which any number of jaegers was seen was July 19, at the mouth of Naknek River on Bristol Bay. There we found fifteen jaegers, twelve of this species, and a few gulls hanging about an anchored cannery boat. A pair with two young just able to fly was seen on a gravel bar on the Kvichak River (July 28) and two followed our boat for a half hour in the Gulf of Alaska (August 11).

All of the adults observed were in the dark phase except the group in Bristol Bay which was divided about equally between dark and light plumages.

LONG-TAILED JAEGER, *Stercorarius longicaudus* Vieillot.—The first 'long-tail' that was seen flew across our bow as we were headed north toward Yakutat along the Fairweather Range (June 7). The species was not noted again until a single bird was found on St. George Island (July 3). On St. Matthew (July 9) a pair with two young, still not able to fly too well, was watched as the two birds maneuvered over a large mountain meadow. These birds were among the most graceful on the wing of all the birds seen on the trip, at times appearing like giant Barn Swallows. Three birds were seen each day,

July 10 and 11, on the two widely separated points visited on Nunivak Island. A single 'long-tail' was observed at Dillingham (July 17) and three, associated with a large number of Parasitic Jaegers, were seen on Bristol Bay (July 19). A pair with two young was watched for a time in Mt. McKinley Park on August 2 and two of this family were noted again the next day.

[CHILEAN SKUA, *Catharacta chilensis* (Bonaparte).—A single skua, perhaps of this species, followed our boat for about half an hour in the Gulf of Alaska (August 12).]

GLAUCOUS GULL, *Larus hyperboreus* Gunnerus.—This large and beautiful gull was seen only once outside of Bering Sea. The exception was a bird in second year plumage in Yakutat Bay (June 8). Two or more individuals were present among the Glaucous-winged Gulls on Walrus Island (July 7); there were so many gulls in the air, however, that I could not be certain whether there were more of the glaucous species or whether I was seeing the same birds repeatedly.

A few pairs were observed nesting on the high cliffs at the south end of St. Matthew Island and a group of twenty-five birds was seen on a bar in a small lagoon (July 8). The next day there were fifty birds sitting at the mouth of a little stream and a few apparently on nests on the flat top of a nearby rock pillar. The 'burgomaster' was common on both days on Nunivak (July 10 and 11) and a number were present on Nelson Island (July 12).

GLAUCOUS-WINGED GULL, *Larus glaucescens* Naumann.—This species was a constant daily attendant on the 'Brown Bear' and, while by no means as abundant as some other seabirds, it had a more uniform distribution along the coast. It was seen in small numbers everywhere except in the interior and in great concentrations about operating canneries. The largest aggregations of these birds were noted in Bristol Bay and Cook Inlet where every active cannery had a large number of attendant gulls.

The birds nested in small colonies along the rocky headlands or even on the flats of some of the islands. Every large murre and kittiwake colony had its smaller population of Glaucous-winged Gulls bent on picking up some of the easy living to be found about these bird cities. The largest colonies of this species were found on Bogoslof Island (June 24) and Walrus Island (July 7). In both, the nests were on the more level parts of the islands and covered acres of land.

No particular effort was made to locate nesting colonies, but notes were kept on those we found while conducting routine visits to various areas for other purposes. Nesting birds and nests with either

eggs or young were noted as follows: Resurrection Point, Seward, Barren Islands, Whale Island, west side of Kodiak Island, Morzhovoi Bay, Bereskin Island near Akutan, Bogoslof, Chagulak Island, Tanaga Island, Walrus Island, Iliamna Lake, and Chisek Island. Many of these smaller colonies contained trails beaten through the grass by natives gathering eggs. Typical nests were on the ground in more or less thick vegetation, although in several cases, such as at Chagulak, Tanaga, and Chisek, the nests were among rocks.

HERRING GULL, *Larus argentatus smithsonianus* Coues.—Herring Gulls were occasionally observed from the steamer between Seattle and Ketchikan, but it was difficult to pick them out among the swarming masses of other gulls about the canneries and docks.

Several individuals were identified in the group that followed us across the Gulf of Alaska (June 9). There was a small mixed colony of this species and the Short-billed Gull on a little grassy island on the Copper River Flats (June 10). A few individuals were noted about the Kenai Peninsula and at various points along the base of the Alaska Peninsula.

SHORT-BILLED GULL, *Larus canus brachyrhychus* Richardson.—This species was fairly common in both adult and immature plumages about the southeastern Alaska harbors in early June. Three nests with two eggs, one nest with three, and one young bird able to swim lustily were found in a small colony on the Copper River Flats (June 10). They were fairly common in the interior in late July and early August.

BONAPARTE'S GULL, *Larus philadelphia* (Ord).—This beautiful little black-headed gull was still in flocks in early June. Of ten in Petersburg harbor (June 4), three were in full spring plumage and the others showed various stages of advance into the spring dress. Birds noted in Juneau (June 5), as well as two large north-bound flocks that passed our boat off Mount Crillon (June 7), showed the same mixture of plumages, as did also groups at Yakutat and the Situk River (June 8). All of the birds of a flock outside of Sand Point in the Shumagins (June 20) were in full breeding plumage.

These gulls were very widely distributed about Bristol Bay and Cook Inlet during late July, and the sight of them winging their way along the streams or perched on the topmost twigs of the stunted spruces, while common, was always welcome. We found no nests, but two young birds just learning to fly were seen on Iliamna Lake on July 26.

PACIFIC KITTIWAKE, *Rissa tridactyla pollicaris* Ridgway.—The giant colonies of these trim little gulls provided one of the ornithological

highlights of the trip for me. The graceful flight and the tame and unsuspicious behavior of the birds made them favorites with all. The first individuals were sighted in Yakutat Bay (June 8) and a few followed the boat for a time across the Gulf of Alaska (June 9).

The first colony visited was that on Resurrection Point near Seward (June 11). There were thousands of birds with nests built or under construction on every available ledge along the face of a perpendicular cliff. Few of the nests into which we could see had eggs. These birds build more of a nest than other gulls, making it, in this region, of seaweed and sometimes other material in a small mound with a depression in the top in which two or three eggs are laid. This species, nesting on inaccessible cliffs, was not bothered so much by eggers as were the murres and Glaucous-winged Gulls. Except for marauding by the Glaucous-wings we saw little evidence of predation in these colonies. Each, however, had its quota of these larger gulls which were many times seen stealing eggs and young.

Other large colonies of kittiwakes visited were at Whale Island, Semidi Islands, Chagulak, St. George Island, St. Paul Island, Walrus Island, St. Matthew, Hall Island, and Chisek Island. The nests at Whale Island were fairly accessible and we managed to see into a great many of them. All contained two or three eggs. On Chagulak we could see into a few but found no young hatched. On Walrus Island they were most accessible of all and there I inspected dozens but found no young yet hatched. Nests in the other colonies were entirely inaccessible to us as we were without special equipment. At one of the larger colonies, on Chisek Island, many young were hatched. With the glasses we could see them on the nests and we also found several dozen dead nestlings at the base of the cliff on which the colony was established.

H. D. Gray took two newly hatched young from a colony on Haystack Rocks in the Shumagin Islands (August 1) and brought them to me. This was a colony that we failed to visit on the outbound trip, due to lack of time.

RED-LEGGED KITTIWAKE, *Rissa brevirostris* (Bruch).—One of the disappointments of the trip was my inability, due to lack of time, to visit the great colony of this species on the cliffs of St. George Island. However, I saw numerous birds flying about the village and the nearby tundra ponds. At close range, the stubby bill is very conspicuous; the bird is graceful and beautiful.

Several were seen each day on St. Paul Island (July 4–6) but I failed to find the birds nesting on the Tolstoi cliffs as reported. All the

nesting birds seen there were Pacific Kittiwakes. The 'red-legs' were also reported to nest occasionally on other cliffs of St. Paul and Walrus islands. I did not get to visit all the possible nesting sites on St. Paul Island, but found no red-legged birds nesting either here or on Walrus Island. We also looked carefully over the kittiwakes on St. Matthew and Hall islands for this species, but found none.

SABINE'S GULL, *Xema sabini* (Sabine).—A single bird observed on St. Matthew Island (July 8) flew about over a large lagoon for some minutes, and three birds followed the boat for a time in the Gulf of Alaska (August 11).

ARCTIC TERN, *Sterna paradisaea* Brünnich.—This was the only tern seen during the trip. While rather widely distributed, it was never present in great numbers although several marked concentrations were noted after the breeding season. The largest of these were at the mouth of the Kenai River (July 28) and on the lower Kasilof River (July 29). The species was noted only twice in the interior when single birds were observed in Mt. McKinley Park (August 3) and on Fielding Lake (August 8).

These terns were rather common on the Copper River Flats (June 10) where two nests, containing two eggs each, were found. A small colony was observed on a low sandy island in the lagoon at the north end of Morzhovoi Bay (June 21); one nest with three eggs and two with two eggs each were found there, besides others that evidently had been robbed by some predator. A single pair of Arctic Terns had a nest with two eggs on a little point in Tanaga Bay (June 27). On Nunivak (June 11) I saw a downy young tern in the possession of an Eskimo boy and observed also several free adults.

(*To be continued*)

GENERAL NOTES

Type locality of *Perisoreus canadensis capitalis* Ridgway.—The A. O. U. Check-List (Fourth ed., 1931) gives the type locality of *Perisoreus canadensis capitalis* as "Henry's Fork and Ft. Benton, Wyoming Terr. = Henry's Fork, southwestern corner of Sweetwater Co., Wyoming." The original description by Ridgway [Bull. Essex Inst., 5 (no. 11): 193, 1873] also lists the type locality as "Henry's Fork, Wyoming Terr.; F. V. Hayden."

Review of available records and other data discloses that for his 1873 paper, Ridgway had two specimens or cotypes of his new race of Rocky Mountain Jay. These were an adult and an immature specimen that was labeled "juv." and "young of year." The immature specimen, U. S. National Museum catalog number 18,440, was collected by Dr. J. A. Mullan on April 23, 1860, west of Fort Benton, Montana; the adult, U. S. National Museum catalog number 61,084, was collected on October 2, 1870, by Dr. F. V. Hayden's Rocky Mountain Expedition on Henry's Fork, which this paper will show to be in northeastern Utah rather than in Wyoming as indicated by the Check-List. Both specimens were mentioned in the same report by Mr. Ridgway. Inasmuch as the adult was treated first in his report and was the specimen upon which the principal description was based (and because an adult, rather than a constantly changing juvenile, is usually selected as a type or typical specimen) it seems not unreasonable to restrict the type locality to the place where the adult was collected despite the earlier date of the juvenile's collection.

The original label of the adult cotype in the National Museum states merely that the specimen was taken at Henry's Fork, without indicating the state or territory. The subsequently prepared red type label, however, lists the locality as "Henry's Fork, Wyoming Terr.; F. V. Hayden." The original printed label says, "F. V. Hayden, In Charge," without indicating who collected the bird. The Museum catalog, however, shows that the bird was received from F. V. Hayden but was collected on October 2, 1870, by H. D. Schmidt, who was an assistant to Dr. Hayden on the expedition.

A review of any good atlas will show that Henry's Fork originates in the Uinta Mountains of Summit County in northeastern Utah, flows in a northeasterly direction across the Utah-Wyoming line, and then winds eastward through southern Wyoming, re-entering Utah just before the junction with Green River. The habitat most favorable for the Rocky Mountain Jay is the portion of this area that lies south of the Utah-Wyoming boundary; the Wyoming portion is at a lower elevation, is much more level, and is largely destitute of tree growth where traversed by Dr. Hayden's expedition.

According to Dr. Hayden's annual report (U. S. Geological Survey, Preliminary Report on Wyoming and Portions of Contiguous Territories, chaper 5: 54–56, 1871) he and his party left Fort Bridger (about 22 miles north of the Utah-Wyoming border) by pack train on the morning of October 1, 1870, and during that day passed from Smith's Fork to Henry's Fork and up this stream to the foothills of the high Uintas, 29 miles south of Fort Bridger. On the following day (October 2) the party proceeded up Henry's Fork, riding "up to a point above the limits of arborescent vegetation . . . to a point 12,265 feet above the sea, and ascended to the summit of Gilbert's Peak." That night, at an elevation of 9,833 feet, they camped in an open meadow "at the source of one of the branches of Henry's Fork." During this day the party collected the specimen of the Rocky Mountain Jay that

later became one of the cotypes of *P. c. capitalis*. Other mountain forms were collected during the same day and included *Melospiza l. lincolni*, *Sitta canadensis*, *Penthestes atricapillus septentrionalis*, and *Corthylio calendula*.

From the evidence at hand it seems clear that the entire day was spent in Utah; consequently, the restricted type locality for *Perisoreus canadensis capitalis* should be listed as Henry's Fork, Utah.—ANGUS M. WOODBURY, *University of Utah, Salt Lake City, Utah,* AND CLARENCE COTTAM, *U. S. Fish and Wildlife Service.*

Records of Sharp-tailed Sparrows from Maryland and Virginia in the National Museum.—The description of the James Bay Sharp-tailed Sparrow as a distinct race by Todd,[1] and other recently published observations on the subspecies of this marsh sparrow have made it desirable to check the material in the United States National Museum with the new information that is now available. I now recognize five forms. To correct previously published records for these birds from Maryland, the revised identifications are listed below under the names I now accept; to these I have added records for other specimens in our collection from Virginia and the District of Columbia as a matter of interest to ornithologists in these sections.

Ammospiza caudacuta diversa

Maryland: Ocean City, April 29, 1929, August 13, 1926, October 6, 1928, November 9, 1929; Cornfield Harbor (on Potomac River, one mile above its mouth at Point Lookout), April 24, 1932, October 13, 1929; Chesapeake Beach, July 4, 1929; Green Run Inlet, August 22, 1937.

Virginia: Smith's Island, May 14, 1910, December 18, 1898; Wallops Island, May 27 and 28, 1913.

This very distinct race is the breeding form of the coastal area north, according to Montagna, to Rehoboth and Bethany Beach, and probably to Lewes, Delaware, and Tuckerton, New Jersey. The specimens recorded above from Wallops Island, taken by W. L. McAtee, constitute another southern nesting record. The two males obtained were breeding birds, as in June, 1913, with Mr. McAtee, I examined the bodies preserved in alcohol. A juvenile specimen taken on Pea Island, North Carolina, by Dr. Paul Bartsch has been recorded (Wilson Bull., 54: 256, 1942) through a misunderstanding as this race but proves to be the Seaside Sparrow (*Ammospiza m. maritima*), and there is question as to whether the bird breeds that far south. The Wallops Island record by McAtee may be near the southern nesting limit.

Ammospiza caudacuta caudacuta

Maryland: Cornfield Harbor, October 13, 1929.

Virginia: Smith's Island, December 18, 20, and 22, 1898.

This migrant from farther north should be common in the coastal marshes at the proper season.

Ammospiza caudacuta subvirgata

Maryland: Cornfield Harbor, October 13, 1929.

This bird also should be regular in migration.

Ammospiza caudacuta altera

Maryland: Ocean City, November 9, 1929; Cornfield Harbor, October 4, 1931.

Virginia: Four Mile Run, near Alexandria, Alexandria County, September 18, 1893.

[1] *Ammospiza caudacuta altera* Todd, Auk, 55: 117, 1938 (East Main, James Bay, Quebec). For discussion see Oberholser, H. C., Bull. Dept. Cons. State of Louisiana, 28: 652, 1938; Montagna, W., Wilson Bull., 54: 107–120, 1942; and Peters, J. L., Ann. Carnegie Mus., 29: 201–210, 1942.

Ammospiza caudacuta nelsoni

Maryland: Cornfield Harbor, October 11, 1931, and October 14, 1928.
Virginia: Cobbs Island, May 12, 1892.
District of Columbia: September, 1862.

This race, with the James Bay Sharp-tailed Sparrow, comes to inland marshes in migration, while the other three frequent regions of brackish water.—ALEXANDER WETMORE, *U. S. National Museum, Washington, D. C.*

The type locality of *Nectarinia dabryii* Verreaux.[1]—Under the heading "Catalogue d'Oiseaux récoltés par Mgr. Perny, évêque du Su-tchuen, dans le nord de la Chine, et description de deux espèces nouvelles par M. Jules Verreaux," the author described *Nectarinia Dabryii* (Rev. et Mag. de Zoologie, (2) 19: 173–174, pl. 15, 1867) with the statement: "Cette belle espèce, que nous devons à l'obligeance de M. Soubiran, a été découverte dans le nord de la Chine, par M. Dabry, consul de France, auquel nous sommes heureux de pouvoir la dédier. . . . Depuis la réception de cet Oiseau, nous avons eu la bonne fortune d'en voir plusieurs autres sujets, entre autres, parmi les Oiseaux de la même localité, rapportés par Mgr. Perny . . ." It seems clear that the type must be the specimen associated with Dabry and that those in Perny's collection are merely paratypes.

The type locality is first questioned by Lord Walden [Ibis, (n.s.) 6: 35, 1870], who gives the species as "découverte dans le nord de la Chine," but observes: "There must be some mistake about its habitat; Cochin China is probably intended."

In the same volume of 'The Ibis' (pp. 296–297), P. L. Sclater, in a letter to the editor, writes: "In Lord Walden's excellent article on the Sun-birds of the Indian and Australian regions in the last number of 'The Ibis,' it is well remarked (p. 35) that there must be some mistake about the habitat of *Aethopyga dabrii* as given by M. Verreaux, namely, *'le nord de la Chine.'* I am fortunately able to confirm Lord Walden's criticism, and to give the exact locality of this fine species. The type-specimen of this species was from the collection formed by Msgr. Chauveau on the hills above Ta-tsien-leou, which border the eastern boundary of the Chinese province of Sechnen [*sic*], and was transmitted by him to M. Dabry, the French Consul at Hankow. This collection, which I had the pleasure of examining shortly after its arrival at Paris, likewise contained the new *Lophophorus lhuysi* and the new *Ithaginis geoffroyi*, also described by M. Verreaux, besides some other remarkable novelties. . . ."

David and Oustalet (Oiseaux de la Chine: 80–81, 1877), under *Aethopyga dabryi*, state: "Le Sucrier Dabry . . . ne se trouve en Chine que dans les provinces méridionales et occidentales, et c'est par erreur qu'il a été indiqué par J. Verreaux, dans la description originale, comme provenant du nord du Céleste-Empire. Le spécimen que Verreaux avait eu sous les yeux avait été recueilli sur les collines situées au-dessus de Tu-tsien-leou, à la limite orientale du Setchuan, par Mgr. Chauveau, et remis par ce dernier à M. Dabry, consul de France à Hankeou. . . ." Obviously, David and Oustalet here simply translate Sclater's remarks of 1870, repeating his inadvertence in regard to the "eastern" boundary and, presumably through a printer's error, spelling the name of the town with a 'u' instead of an 'a.'

In any case, no one has doubted that the type of *Nectarinia dabryii* came from the well-known town in western Szechuan called Ta-tsien-lu, until Messrs. Delacour and Greenway, describing *Aethopyga gouldiae harrietae* (L'Oiseau et la Revue

[1] Published with permission of the Secretary of the Smithsonian Institution.

française d'Ornithologie, nos. 1, 2: 68–69, 1940), state dogmatically, *ex* David and Oustalet, that "le type de *dabryi* provient de Tutsienléou (et non pas Tatsienlou), à la limite orientale du Setchuan . . ."

Since, up to the present, no less than three subspecific names (*dabryii, bangsi,* and *harrietae*) have been bestowed upon Chinese populations of this species, it is imperative, in the interest of a stable nomenclature, to determine whether the name *dabryii,* the oldest designation, is to apply to the bird of Ta-tsien-lu or to that of a hypothetical "Tu-tsien-leou" in eastern Szechwan; such a decision is rendered the more important by the fact that the resident population of eastern Szechwan, if it exist, may well be racially distinct from that of the western part of the same province.

I am convinced that Ta-tsien-lu must be considered the true type locality for the following reasons:

(a) The town "Tu-tsien-leou" is known to ornithology by one passage in David and Oustalet, which seems to be a direct translation from Sclater, who spelled it "Ta-tsien-leou."

(b) The Vicariate-Apostolic of Tibet (Fourth Ecclesiastical Region of China), embracing the eastern portion of Tibet and the western portion of Szechwan, was erected in 1846, with residence at Ta-tsien-lu. Joseph-Marie Chauveau (*b.* 24 Feb., 1816; *d.* 21 Dec., 1877), a priest of the Paris Seminary, held the dignity of Vicar-Apostolic of Tibet from 1864 to 1877 and resided at Ta-tsien-lu, near the eastern boundary of his vicariate. Eastern Szechwan falls into another Vicariate-Apostolic, with which Chauveau had no connection that I can discover (*cf.* The Catholic Encyclopedia, 14: 720, New York, 1912; also the ecclesiastical map of China, 3: between pp. 686 and 687).

(c) Sclater [Ibis, (n.s.) 6: 297, 1870] notes that "*Thaumalea amherstiæ* . . . according to Msgr. Chauveau, is very abundant in the mountains above Ta-tsien-leou. . . ." A footnote refers to the Proc. Zoöl. Soc. London for 1870, p. 111, where we find: "A communication was read from Mr. R. Swinhoe, F.Z.S., stating that when at Hankow last summer he had ascertained from H. M. Consul in that city that some living Amherst's Pheasants (*Thaumalea amherstiæ*) which had passed that way to England had been received from a French priest, Monseigneur Chauveau, Bishop of Sebastopolis, who was stationed at Ta-tsien-leou, on the Tibetan frontier. . . . Mr. Sclater remarked that there could be no doubt that these birds were those subsequently received by Mr. Stone, and for some time deposited in the Society's Gardens; and pointed out the position of Ta-tsien-leou on the slope on the Yung-lin mountains, between Tibet and the Chinese province of Sechuen." Farther on (*ibid.:* 128–129) we read: "In reference to Mr. Swinhoe's communication at the last Meeting on the locality of the Amherst's Pheasant (*Thaumalea amherstiæ*), Mr. Sclater stated that Mr. J. J. Stone had kindly placed in his hands copies of two letters addressed by Monseigneur Chauveau, Bishop of Sebastopolis and Vicar Apostolic of Lhassa, to Mr. Medhurst, the English Consul at Hankow, one of which was the letter spoken of by Mr. Swinhoe. There could be no doubt, therefore, that the birds collected by Monseigneur Chauveau were the same as those which ultimately reached Mr. Stone, and that this Pheasant is 'exceedingly common' on the hills bordering the western part of the Chinese province of Szechuen, beyond the town of Ta-tsien-loo, through which runs one of the great routes to Lhassa." Still farther on (*ibid.:* 670) we find: "These Pheasants had arrived from one of Mr. Stone's Chinese collectors in company with specimens of

Thaumalea amherstiæ, and were doubtless from the same locality—that is, from the slopes of the Yung-ling mountains beyond Ta-kien-leu, on the Chinese confines of Thibet. . . ."

These references, while not directly concerning *Nectarinia dabryii*, indicate that all birds with definite locality received from Msgr. Chauveau seem to have come from Ta-tsien-lu and it is important to note that almost wherever the name is used in them, it receives a new variant transliteration!

Assuming that the bird of Ta-tsien-lu must be called *Aethopyga gouldiae dabryii*, I find it impossible to distinguish between *dabryii* and *harrietae;* I suspect that the richness of the reds and the purity of the metallic blue vary directly with the freshness of the feathers in question and perhaps individually as well. Moreover, the examples placed under the latter name are, certainly in Thailand and probably in Laos (type locality), merely winter visitors from China.

The population of Hupeh have been named *bangsi* by Riley (Proc. Biol. Soc. Washington, 38: 11, 1925); they seem to differ from *dabryii* in the duller red of the mantle, the less intense scarlet of the breast, and the sharper demarcation of the scarlet and yellow areas of the under parts, but here again we may be dealing with seasonal and individual variation and the validity of the race is not yet established.

For the loan of valuable material of *bangsi* and *harrietae*, I am indebted to the authorities of the Museum of Comparative Zoölogy, Cambridge, Massachusetts.—H. G. DEIGNAN, *U. S. National Museum, Washington, D. C.*

Popular subspecies.—The public is sometimes just as keen on making fine distinctions among birds as are the systematic ornithologists. A very well-known illustration is the widespread belief that there are two kinds of Black Ducks. That opinion is reflected in a considerable number of local names, of which those available, that can be cited in contrasting pairs from the same regions, are here tabulated:

Locality	*Anas rubripes tristis*	*Anas rubripes rubripes*
Delaware	Nigger black duck	Red-paddle
Massachusetts	Green-legged black duck	Red-legged black duck
	Pond black duck	Bay duck
	Putty-legs	Redleg
	Spring black duck	October duck
	Summer black duck	Winter black duck
New Jersey	Grassy channel black duck	Sedge black duck
New York	Long-necked black	Short-necked black
Ohio	Little green-leg	Big winter Jackie
	Little green-legged Jackie	Red-legged Jackie
Rhode Island	Pond black duck	Sea duck
Nova Scotia	Beach duck	Ledge duck
	Inside duck	Outside duck

While this splitting was given taxonomic embodiment by William Brewster (Auk, 19: 183–188, 1902) and was incorporated in the A. O. U. Check-List (4th edition: 44, 1931), it was not accepted by Dwight who stated (Auk, 26: 422–426, 1909) that *rubripes* birds are the adults, and *tristis* individuals the immatures, of a single species. In this he was supported by Pirnie ('Michigan Waterfowl Management': 12, 1935) and Trautman (Misc. Publ. Mus. Zool. Univ. Mich., 44: 179, 1940). The arguments for and against are reviewed by Kortright in his recent valuable book ('The

Ducks, Geese, and Swans of North America': 168–170, 1942). Shortt (Wilson Bulletin, 55: 1–7, pl. 1, 1943) clearly shows that the coloration of the soft parts, which has been mainly relied upon for differentiation of the supposed subspecies, varies with age, sex, and eclipse, and he labels the evidence as tending to refute the existence of the subspecies.

The writer wishes to draw attention to two other examples among the waterfowl that should be investigated by systematists. In Missouri, a quarter of a century ago, he found a rather general conviction among sportsmen that two races of Mallards occur. The case resembles that of the Black Duck in that the popular names tend to contrast the characteristics of immaturity and lesser hardiness with those of maturity and greater stamina. The birds of the early fall flight were known by the names, red-legged mallard, redlegs, prairie mallard, and timber mallard; and those of the late flight as yellow-legged mallard, yellowlegs, frostybeak, ice-breaker, ice duck, ice mallard, snow mallard, and twister.

The second instance, also from Missouri (vicinity of Kansas City) in the same period, was the report of the killing in older times of exceptionally large (*i. e.*, 14–16 pound) geese of the Canada type, which were thought to represent a distinct, and possibly an extinct, race. Roy N. Bach of the North Dakota Game and Fish Department has favored me with information he has collected on large geese in that state. Some of it came from the well-known sportsman, the late Wm. B. Mershon, who reported as local to Kidder County in the 1880's a breed of Canada Goose ranging from 14 to 18 pounds in weight. Another correspondent, A. P. Paulson of Rogers, North Dakota, claims to have killed in 1886 and 1887 two honkers, weighing 18 and 21 pounds, respectively. Stanley Saugstad informs me that this "big goose" is also referred to by the vernacular name of 'Mershon goose.' Bird taxonomists are urged to give attention to these and other popularly conceived races. The northern plains goose seems even to have the geographic qualifications for a subspecies, but a complicating record should be noted. It refers to 17-pound birds shot in British Columbia in the 1860's (Mayne, R. C., 'Four Years in British Columbia and Vancouver Island': 418, 1862).—W. L. McAtee, *Fish and Wildlife Service, Chicago, Illinois.*

Comparative weights of northern and southern subspecies.—Although it is known that most species of birds having an extensive north to south distribution are larger in the colder parts of their range (Bergmann's rule), actual measurements to this effect are few. Weight is probably the best measurement for this purpose, as it is proportional to general size, while the size of appendages may vary independently. The following weights of three Florida subspecies, secured during the period from March 30 to April 21, 1943, at the Archbold Biological Station (operated in coöperation with the American Museum of Natural History) near Lake Placid in southern Florida, are perhaps worth recording in this connection, although too few to give a very accurate average weight. For comparison, weights of northern races of the same species are added. The weights of northern Blue Jays and Grackles are of spring specimens in the Museum of Zoology, University of Michigan. I am greatly indebted to Dr. J. Van Tyne for sending them to me. The weights of the Eastern Cardinal are from Ohio birds weighed during the period of March through June and recorded by Baldwin and Kendeigh (Auk, 55: 438, 1938). All weights are in grams.

? Semple's Blue Jay (*Cyanocitta c. ? semplei*)	1 ♂: 86.2 (86.2)	3 (?): 70, 74, 80
Northern Blue Jay (*Cyanocitta c. cristata*)	10 ♂: 83.4–96.6 (88.1)	7 ♀: 82.0–91.0 (86.2)
Florida Grackle (*Quiscalus q. aglaeus*)	8 ♂: 97–114 (108.1)	6 ♀: 74–86 (79.8)
Bronzed Grackle (*Quiscalus q. aeneus*)	23 ♂: 103.7–132.8 (120.2)	9 ♀: 96.4–107.8 (101.3)
Florida Cardinal (*Richmondena c. floridana*)	1 ♂: 37.7 (37.7)	2 ♀: 36.3, 37.0 (36.7)
Eastern Cardinal (*Richmondena c. cardinalis*)	30 ♂: — (43.8)	10 ♀: — (44.1)

—Dean Amadon, *American Museum of Natural History, New York, N. Y.*

Long-billed Curlew eating trapdoor spiders.—Among such few references as I have seen to the food of the Long-billed Curlew (*Numenius americanus americanus*), I note that C. W. Wickersham (Auk, 19: 355, 1902) includes "spiders" in the fare. The following personal observation by my friend, Lee Passmore, of San Diego, who is a close student of spiders, may be of interest in this connection. In early April, 1940, he told me that he had watched curlews driving their bills deep into "something" on the grassy uplands about two miles east of Imperial Beach, California. Upon investigating the area, he discovered that they had been eating trapdoor spiders. He found the doors of nests thrown back and the spiders gone. On April 7, 1940, I visited the scene to determine which of the two species of curlew was involved and found that it was the Long-billed Curlew. Thus was added some new information not only relative to curlews but also to natural enemies of the trapdoor spider.—Clinton G. Abbott, *San Diego Society of Natural History, Balboa Park, San Diego, California.*

Pipits eat injurious insects.—Large migrations of a few hundred to several thousand individuals of the American Pipit (*Anthus spinoletta rubescens*), possibly associated with some pipits of other sorts, have been encountered in northern Utah. Such a flock was found to extend from Blue Creek to Lampo, in Box Elder County, Utah, October 11 and 12, 1934. Another large flock covered this same area on October 9, 1935. A large flock extended from Petersboro in Cache County, to Collinston in Box Elder County, on October 5, 1942. Smaller flocks were encountered in Tooele County on September 25 and in several parts of Box Elder County on September 30, 1942; at Neola and Hayden, Utah, October 8, 1936; and at Ephraim, October 9, 1936.

Examination of 103 pipit stomachs, collected largely from birds feeding in alfalfa and wheat stubble fields and along weedy and sagebrush roadsides, during autumns of the past eight years, revealed the following recognizable insects to be present: two Thysanura; twenty Collembola; thirty Orthoptera in twenty-four stomachs, of which twenty-six were field crickets; one Neuropteron; five thrips; 1,944 Hemiptera of which 1,641 were Lygaeidae, including 1,586 false chinch bugs (*Nysius ericae*) in thirty-two stomachs, and nine *Geocoris decoratus;* fifty-four Miridae (eight *Lygus elisus* and two *L. hesperus*); four predacious Anthocoridae (two *Orius tristicolor*); five Nabidae, five Pentatomidae, one Coreid and one Aradid; 206 Homoptera included ninety-two beet leafhoppers, three Fulgoridae, four psyllids, seven Coccidae and ninety aphids of which twenty were the injurious pea aphid (*Macrosiphum pisi*); 561 beetles of which five were larvae, included 261

Sitona hispidula, fourteen alfalfa weevils and 145 other weevils, fourteen ground beetles, thirty-six rove beetles, four click beetles, one Melyrid, three blister beetles, one Silphid, one Lampyrid, seventy-five Scarabaeidae, and one Mordellid; two adult moths and 107 lepidopterous caterpillars; twenty-six adult and four larval Diptera; sixty Hymenoptera of which twenty-three were ants and two Chalcidoidea. Also found were twelve spiders and mites and approximately 479 weed seeds besides three kernels of wheat, doubtless waste from the stubble field.—GEORGE F. KNOWLTON, *Utah Agricultural Experiment Station, Logan, Utah.*

Red-wings eat pea aphids.—On April 23, 1942, a male Thick-billed Red-wing (*Agelaius phoeniceus fortis*) was collected in an alfalfa field southeast of St. George, Utah. Microscopic examination of its stomach contents revealed that it contained a great mass of pea aphids (*Macrosiphum pisi*) estimated to exceed 1400 individuals. The pea aphid population in this field was high enough to cause moderate crop injury. A second male red-wing was collected approximately one-half mile away along an alfalfa-field fence line and near to sugar-beets. This stomach contained 85 pea aphids; one of four additional aphids it contained was a green peach aphid (*Myzus persicae*), a species that causes some damage to nearby sugar-beets intended for seed production. Additional insect food in these stomachs included five Hemiptera (one a *Lygus elisus*); five lepidopterous larvae, apparently cutworms; nine beetles, one of which was a clover-root curculio (*Sitona hispidula*); and three Hymenoptera. The stomachs also contained one spider and eight weed seeds.—GEORGE F. KNOWLTON, *Utah Agricultural Experiment Station, Logan, Utah.*

A Chuck-will's-widow carrying an egg.—At Lake Mound, Pinellas County, Florida, on May 17, 1943, a rather unusual circumstance was observed that seems worthy of record. A Chuck-will's-widow (*Antrostomus carolinensis*) was flushed from the edge of a thicket at about 10 A. M. The bird fluttered about in a circle several times close to the ground and appeared to be carrying an object in one of its feet. When it alighted on a low-hanging live-oak branch not more than twenty feet from me, I recognized the object as an egg. I purposely flushed the bird several times to observe the manner in which the egg was carried. While the bird was resting on the tree limb, the egg was held against the breast and close to the wing, being carried in the left foot.

Later in the afternoon of the same day, the bird was again flushed but this time did not carry the egg. I examined the spot from which it had been flushed and found the egg shell completely separated and the young struggling to free itself. I considered it most unusual that such a weak-footed species could carry an egg in this manner. In all probability the shell was extremely porous and fragile just prior to hatching, and the bird had accidentally imbedded its claws into the shell and was unable to release them.—G. N. RYSGAARD, *1st Lt., Signal Corps, U. S. A., Tampa, Florida.*

Normal and inverted courtship feeding by the Robin.—The behavior called 'courtship feeding' appears to be rare among Robins (*Turdus migratorius*). In his summary of it, Lack (Auk, 57: 176, 1940) reports it "apparently absent in *Turdus*." Howell (Am. Midl. Nat., 28: 567, 1942) did not see it during a study of many Robin nests at Ithaca, N. Y., and (*tom. cit.*: 556) offers only one reference: a McClanahan manuscript telling of its occurrence at a nest near Cheboygan, Michigan. The inversion of this behavior—*i. e.*, the begging of food by the male from the female—appears to be almost unknown in any species; Lack (*tom. cit.*: 170)

records it only in the Button Quail (*Turnix*), the Common Tern (*Sterna hirundo*), and, under artificial conditions, the British Robin (*Erithacus rubecula melophilus*).

At a nest of Robins watched in Baltimore in 1943, I imperfectly saw one apparent instance of normal courtship feeding, and clearly saw one instance of the inversion—the male sought food from the female, and although she had none to give him she made the motion of feeding. These birds differed greatly in coloration, and sex had been determined earlier in the nesting.

NORMAL.—On the day (June 20) after the third and last egg was laid, I looked up from jotting a note about the sitting female to find the male perched on the nest rim and the heads of the two birds together. I could not see plainly what was occurring, but felt morally sure that the male was feeding the female. A few seconds later I did plainly see the female pick at the male's bill or chin, and see the male swallow, as if both were disposing of remnants of food. Shortly afterward, the male flew away. This, incidentally, was the only time during about nine hours' dry-weather watching of incubation that I saw the male visit this nest.

It should be noted, however, that the date indicates this nest to have been a second-brood one, for that raises the possibility that instead of being true courtship feeding, the behavior I saw was an example of confusion on the part of a male still feeding first-brood young; *cf.* my record (Wils. Bull., 55: 78, 1943) of an anachronistic feeding incident early in incubation at a second-brood nest of the Wood Thrush (*Hylocichla mustelina*) which resembled courtship feeding.

INVERTED.—The inverted feeding behavior accompanied an also abnormal instance of egg-covering by the male, during rain. The day (June 29) was the twelfth of steady incubation; the first egg was just about to hatch. The rain was a succession of heavy showers connected by drizzles and mistings. At a time when the fall was light, the female left the nest, but soon after she had gone it turned moderately heavy. Then I discovered the male, partly hidden by foliage, on the nest rim, and as the rain continued he went onto the nest in normal incubating position. Less than a minute later the female returned. The male, still sitting, held up his open bill toward her, and when she made no response he pecked at her closed, empty bill. Thereupon she put her bill inside his and he 'sucked' at it—drew his mandibles down over hers—a number of times. Then, half a minute after she had arrived, he rose and flew away and she went onto the nest—HERVEY BRACKBILL, *Baltimore, Maryland.*

Purple Grackle kills English Sparrow.—The captive animals in the National Zoological Park, Washington, D. C., require constant attention, but at times I have an opportunity to observe the unrestricted fauna of the park. While walking in front of our bear dens the other day (June 11, 1943), I was surprised to see a Purple Grackle (*Quiscalus quiscula quiscula*) stalking in almost cat-like manner an English Sparrow (*Passer domesticus domesticus*). The sparrow was not long out of the nest, but was able to fly and take care of itself. A few days later I walked along this same area, and saw the kill. The grackle approached the sparrow and as the smaller bird flew away, the attacker seized its prey in its beak and gave it several hard shakes, with the body of the sparrow hitting the hard concrete pavement. At this moment passersby frightened the grackle away, but later the bird returned to eat the viscera of the sparrow.

In April, near the hunting ground of this grackle, I discovered the nesting site of several of the species. Their bulky but rather compact nests of mud, lined with fine grasses, were about thirty feet up in a group of conifers.

Near our large-mammal house a Chipping Sparrow (*Spizella passerina passerina*) has established territorial rights and greets me as I walk along the path that leads to the animal house. This little fellow is very friendly and follows me until I drop a few grains of canary seed (*Phalaris canariensis*) upon which it feeds. One afternoon this little bird came up to me and by its behavior I knew it to be in distress. A large seed had become lodged in its beak. The bird had attempted to eat it but, due to its size, was unable to swallow it. As well as I could see, the attempted meal appeared to be a small coffee bean.—MALCOLM DAVIS, *National Zoological Park, Washington, D. C.*

Parrots and vitamin B.—Last winter I fell heir to five cacique parrots—three black-headed and two yellow-headed. The yellow-heads and one black-head were compatible and had been kept in a common cage at the Hershey Zoological Garden. One of the yellow-heads on arrival was found to be pretty well denuded of feathers and this one, having practically finished the picking job, extended these services to the other two birds, producing an unsightly mess. Change of diet and other treatment produced no relief.

In the meantime a large yellow-headed Amazon, a family pet for more than a quarter of a century, became droopy, listless, and 'dopey,' and it occurred to me to apply some of the much-vaunted and advertised vitamin-B complex. All of our birds are very fond of toast soaked in coffee. Administration of the drug, therefore, was a simple matter. A large drop of syrupy stuff was placed in a deep saucer, coffee was poured on it and mixed, and the toast was soaked in this. The birds apparently were unaware of the dose. Result: the Amazon picked up promptly and, still more surprising, the three smaller birds are again (June 16, 1943) almost in full feather, and picking and denuding appears forgotten or at least interrupted.

I am mindful of being told by a keeper of birds at the zoological garden that there was practically no remedy for this 'bad habit.' It is for this reason that I wish to bring our experience to the attention of people suffering from similar misfortune.—PAUL BARTSCH, *U. S. National Museum, Washington, D. C.*

Kingbird behavior.—The note in 'The Auk' for January, 1943, on Kingbirds' disposition of excrement leads me to write of an exactly similar case to which my attention was called two years ago in North Berwick, Maine. A pair of Kingbirds (*Tyrannus tyrannus*), nesting near my sister's house, brought all the excrement of the nestlings to her bird bath and dropped it in the water. Although frequently washed out, the amount was so profuse that she finally covered over the bath.

Some years ago an interesting nesting of the Kingbird occurred in the eaves-gutter of this house, which is very high—three tall stories. A pair of Kingbirds built in the gutter. For fear that the nest and young would be washed out in the first rain, attempts were made to frighten them away. However, there was a bad drought and just before the first rain, four little Kingbirds sat in a row on the ridge-pole! I believe a similar case was reported in Bird-Lore.—DR. ANNE E. PERKINS, *Berwick, Maine.*

Nesting of the Laughing Falcon.—Over most of Tropical America, the Laughing Falcon [*Herpetotheres cachinnans* (Linn.)] is not uncommon, although much better known through voice and reputation than by sight to the average human inhabitant of its territory. It figures prominently in native folklore and superstition and is regarded as a bird of many accomplishments, the most universally known

of which is the ability to forecast rain. Field ornithologists, too, have always been impressed with the personality of this remarkable falcon but, in spite of such widespread and varied interest, nothing authentic seems to have been put on record regarding its nesting. The statement of the Penards in their 'De vogels van Guyana' that it builds a nest of twigs in trees and has two young was admittedly based on reports of Indians, as was probably that of Schomburgk, as quoted by Chubb in his 'Birds of British Guiana,' to similar effect.

In May, 1941, Sheffler visited Guirocoba in extreme southeastern Sonora, Mexico, a locality which, in recent years, has gained some prominence as the headquarters from which naturalists in many fields have explored the surrounding country. By the most extraordinary good fortune, three nests were located, all within a mile or two of the ranch house. The field account of these nests is transcribed below. Preliminary to the notes it may be said that the valley of Guirocoba is roughly and irregularly oval, perhaps four or five miles by two. Most of it was at one time under intensive cultivation but now has largely reverted to mesquite thickets and weeds. A permanent stream, beautifully bordered by giant native cypresses or *Sabinos* is fed by seepage and trickles from wooded cañons in the surrounding mountains and escarpments. It is near the upper limit of the Arid Tropical Zone at an elevation of about 1500 feet, and the primitive cover, aside from the ubiquitous mesquite and giant cactus, is a thin decidous forest of low average height.

"May 10, 1941 . . . One of the boys returned saying that he had found a 'Huaco' but no nest, and would like to borrow my gun . . . In an hour he was back with the bird [and] said that he had now found the nest near where he had shot it, as the mate had flown off when he had shot this one, which was a male. In the meantime another boy came about a second nest. We first visited the site where the male had been killed and a natural hole in the perpendicular wall of the cañon was pointed out as the nest. This was reached from above without too much difficulty. Back in this pothole about one foot from the entrance was a depression in a very large pile of leaves, those in the depression being green or nearly so. In the depression was one white egg, in appearance like a typical owl egg about the size of a spotted owl's. No bird was seen although the male had been shot within a very few feet of the nest. This cañon is dark and very heavily wooded, and although the nest cavity is on the straight cañon wall it is so dark and gloomy here and the wall itself [so covered] with orchids and other clinging plants [that] the site is very difficult to see. . . . Left with the other boy for nest site number two, [which] is about one and one-half miles south of number one. Cañon about the same as the first although not quite so well wooded. Nest site within seventy-five yards of a well travelled trail . . . and impossible to get to without lots of rope. Bird flushed from the nest site and was collected,— . . . a female which had long been incubating.

"May 11, 1941. Left early for nest number two. Nest a deep depression in lots of leaves [those in the depression green as before]. Contents one very young and very hungry Huaco . . . probably not over four or five days old.

"May 12, 1941. Visited number three nest today. Not much luck, for although two Huacos were seen in this dark cañon it was not possible to get within gun range. Nest located similar to numbers one and two and about one mile northwest of number one. Nesting material same [but] nest cavity larger and nest of loose leaves much farther back from the entrance. Nest contained a single egg . . . with incubation almost completed. The nest was forty feet from the cañon floor and ten feet from the top of the cliff.

"The McCarty sisters say that although they have seen this bird several times over a period of almost twenty years, yet they have rarely seen it more than once or twice in any one year, . . . usually when the rainy season starts about the twentieth of June. At that time they laugh and play in the very tops of the great *Sabino* trees in the evening before the rain. They saw five playing at one time. There is said to be an old Indian drinking song called 'The Laugh of the Huaco.' The Mexicans call them Rain Crows."

An attempt to keep the young bird alive was without success and it was prepared as a specimen. Colors of the soft parts were as follows, all of them except the bill and claws from a Kodachrome film and not from the living bird: Iris, dark brown; bill, black, with base and cere putty color; tarsi and feet, grayish blue; claws, black. There is no color plate in Ridgway's 'Color Standards and Color Nomenclature,' 1912, which matches the rather uniform body color of this chick. It may be described as immaculate, light brownish buff, perhaps nearest to pale 'Clay Color,' distinctly paler on the chin and throat and deepening gradually to between 'Clay Color' and 'Sayal Brown' on the crown, back, and wings. The outstanding feature is the black facial mask and collar around the nape, precisely as in the adult except that there is no white spot on the lower eyelid. The down is very soft and dense and exceeds in this respect any downy hawk with which we are acquainted; in fact it compares favorably with a newly hatched duckling.

The eggs, as before noted, resemble those of an owl. They are bluntly 'Rounded Ovate,' pure white, and rather smooth in shell texture. Measurements of the two collected are 44.2 x 37.6, and 43.5 x 37.7 mm.

Selection of natural cavities in cliffs as nesting sites in a district where they are abundantly available, together with the peculiar nest which, in each of the three instances, consisted only of a mass of detached leaves, naturally leads to speculation as to the choice of sites and type of nest construction employed in forest areas where cliffs are non-existent.—W. J. Sheffler and A. J. van Rossem, *4731 Angeles Vista* and *Dickey Collections, University of California, Los Angeles, California.*

Notes on the nesting of the Song Sparrow.—In both 1941 and 1942, a pair of Eastern Song Sparrows (*Melospiza melodia melodia*) have nested in the writer's back yard.

On June 7, 1941, four flightless young were in the yard being fed by their parents. In the following October, the nest was found in a barberry hedge, 41 inches from the ground. It contained one unhatched egg.

In 1942, on April 23, an adult was carrying nesting material. On June 3, a nest was found 94 inches from the ground. The nest, which contained four eggs, was between a brick wall and a wire netting that was covered with a dense growth of roses. When examined on June 6, the eggs were gone and the nest was disturbed. The birds nested again in 1942, and on June 24 four small young were in the yard being fed by their parents. In the fall, when the leaves were gone from the roses, two nests were found. The second nest behind the wire was almost directly above the nest of June 3 and eleven inches higher. The young seen on June 24 probably came from this nest.

The above account differs from several statements of Margaret Morse Nice (Wilson Bull., 43: 92–94, June, 1931). Her findings in that paper, based on the study of sixty-four nests, were that a second nest was never placed closer than thirty-two feet from the first and that no nest ranged more than thirty inches from the ground.

The fact that these nests were forty-one, ninety-four, and one hundred and five inches from the ground (eighty inches average height) may be attributed to the fact that no ground cover was available. As there was abundant food supply, the birds utilized the only cover at hand and the nests were thus necessarily close together and some distance from the ground.—ROBERT G. LANNING, *56 Chatsworth Drive, Toronto.*

Chimney Swifts (?) at Manaus,[1] Brazil.—At dusk on March 28, 29, and 30, 1943, a cloud of thousands of swifts, resembling in every visible detail our North American Chimney Swift (*Chaetura pelagica*), was seen hanging over a large, abandoned, red chimney in the town of Manaus, situated on the Rio Negro about a thousand miles up the Amazon valley. The chimney in question is about sixty feet in height and stands near the southeastern limits of the city where a deep, finger-like inlet of the Negro leads inland from its mouth on the northern bank of the great river. This body of water, known as the Igarapé da Cachoeirinha, winds northeastward past a tiny island bearing the picturesque name of Ilha Mte. Christo, and the chimney stands on the mainland but a short distance northwest of this island.

The circumstances under which these observations were made are worth reviewing because of the problem involved, for if this sight record can be later substantiated by specimens, it will be of the highest value in uncovering one of the last unknown winter ranges of a North American migrant bird, a range which has defied thorough collectors so completely for two centuries that we have no evidence beyond logical supposition that this species winters in South America. Our only records of the millions of Chimney Swifts that annually depart from these shores are of a few birds taken in Nicaragua and Panama, and certain reliable sight records of migrating flocks over the Caribbean area. In fact, one feels inclined to bow to old Olaus Magnus, Archduke of Upsala, and to ponder his ostensibly factual illustration showing fishermen seining torpid swifts and other such creatures from the bottom of the sea! However, since his time in the 16th century, we have become assured that birds are not among the varied forms of animal life which hibernate, and the old Archduke has fallen into disrepute.

Some among us have written that when the secret of our Chimney Swifts' migration is finally divulged, in all probability the key to the puzzle will be found somewhere in the vast valley of the Amazon. Whereas in eastern North America Chimney Swifts are the sole representatives of their family, in the Amazonian region they may have remained effectively hidden among many other forms of swifts, nearly all of which at any distance are quite similar in appearance—with the exception of the Palm Swifts of the genus *Reinarda*. Because of this similarity, exact records must, of necessity, be in the form of collected specimens, since most sight records, perhaps even as here recorded, are too uncertain. The chief purpose of this note, then, is to record an observation for the benefit of future investigators.

Our first view of the Manaus 'Chimney Swifts' took place just before dusk on Sunday, March 28, when, after a day of hunting, we were returning by launch with a party of six men including naturalist George A. Seaman. As the boat entered Igarapé da Cachoeirinha within the limits of the city, as evidenced by the hundreds of houses hugging its steep banks, I saw the flock and said: "Look! Chimney Swifts." A flock of these birds settling into a chimney is quite noticeable and so at that time and during the two succeeding evenings when we passed

[1] Spelled 'Manaus,' according to modern Brazilian orthography; formerly Manáos.

that way after working down river, the birds were plainly and simply "Chimney Swifts, migrants from the States." That first evening they were circling in a wide, spiral cone, and at the bottom of the cone a continuous stream of birds filtered into the chimney. Each of the two following evenings they were circling about the chimney more aimlessly, for we passed the spot somewhat too early to observe them entering it for the night.

On Sunday evening, April 4, I set out to obtain specimens, but to my intense disappointment the flock had vanished. Subsequent investigation here at the American Museum of Natural History indicates that I should not have wasted a moment in visiting the chimney, since New Jersey spring arrivals begin as early as April 3 (1926; Rushing), although the first migrants usually reach the New York area in late April and early May.

It is probable that George A. Seaman will still be with the Rubber Development Corporation at Manaus this coming autumn (1943) when the swifts return and, with this in mind, I have written him that the birds may arrive early in November, a deduction based on the following premises: Swifts usually have departed from the New York area by middle October and most have left in early September; autumn records based on specimens are: ♂ and ♀, Cocoplum, Boca del Toro, western Panama, October 28, 1927 (Chapman, Auk, 48: 119–121, 1931); Changuinola River, Panama, October 24, 1926 (Peters, Bull. Mus. Comp. Zoöl., 71: 314, 1921).

I have asked Seaman to try to examine the base of the chimney for feathers and other remains, and to question natives living in the vicinity about the "andorinas." Of course, the ideal solution would be to trap the entire flock, examine them for bands, and then mark them with distinctive bands or waterproof ink; there are a thousand bird observers in North America for every one in Brazil, and some recoveries would certainly be made. Probably no other North American species lends itself so readily to such a reversal of our usual system of banding and if, in time, this plan could be carried out, it is probable that our Chimney Swifts, which until now have kept their secret so well, might become one of our best-known migrants.

The flight characteristics of South American swifts are not too well known, but, having collected eight species and observed probably several more, I can say that none other that I have ever seen acted at all as these Manaus birds did. To me they were the same birds that I had previously seen so often in Maryland, Pennsylvania, and New Jersey, but especially in the last-named state. There during September, on numerous occasions with Mrs. Gilliard, I have paused when homeward bound to watch 'our' swifts funnel into the top of a low chimney, with each flier silhouetted against the golden Kittatinny sky in an ever-increasing band, gathering and waiting that magical instant when they would sail off, perhaps into the Amazon Valley to winter in that red brick chimney overlooking the Ilha Mte. Christo.—E. Thomas Gilliard, *American Museum of Natural History, New York City.*

Northward extension of the breeding range of the White Ibis.—Many observers have noted with interest and satisfaction the gradual but steady extension of the breeding ranges of certain of the herons up the Atlantic coast. It probably is not so well known that a parallel exists in the behavior of the White Ibis (*Guara alba*) in recent years. While it is true that the ibis has been even more gradual in its northward movements, the advance is none the less certain and the season of 1943 has seen another short penetration to the northward. A brief review of

its nesting in South Carolina will be in order since this state marks the most northerly limit on the Atlantic seaboard.

The first instance of the breeding of the species was discovered on May 20, 1922, by the late Arthur T. Wayne and the writer. A colony of some seventy-five pairs was found in a cypress lagoon on Fairlawn Plantation, Christ Church Parish, about eighteen miles north of Charleston. Mr. Wayne recorded the discovery in the Bulletin of The Charleston Museum, 17: 27, 1922. This situation was used for the next four seasons but the colony diminished in numbers and finally died out after a very light nesting in 1926. Probably too many visitors to the lagoon were the cause of the birds' desertion.

A hiatus of several years ensued during which no birds were found in the South Carolina coastal region, though it is perfectly possible that some were there. At any rate, the next discovery was in 1937 on the same plantation but in another lagoon or, as they are called locally, a 'backwater.' The birds were again in cypress growth which appears to be essential to them here. From 1937 through the past season (1943), this colony has returned and has grown steadily. From barely a hundred pairs it has grown now to about 700 pairs. The birds usually arrive in mid-April and young are in the nests by the middle of May.

In the season of 1943, the writer was notified by Andrew H. DuPre, Manager of the Cape Romain Federal Refuge, with headquarters at McClellanville, that White Ibises were nesting in a large cypress backwater on the grounds of the Santee Gun Club with the usual American Egrets and smaller herons which have used this spot for over a hundred years. It is of interest to note here that this is the oldest continually occupied rookery of herons and egrets in the country (*cf.* 'A Magnificent Repository,' Audubon Magazine, 46: 77, 1943) with records of its existence going back to 1823.

This lagoon is on the South Santee River and approximately halfway up the South Carolina coast. While the air-line distance between it and the site of the Fairlawn nestings is not great it represents an advance of some twenty-odd miles and brings the ibis to the banks of the Santee. There were very few there this season (1943)—only some seven or eight pairs—but it means another step forward. Observers along the coastal areas where cypress occurs would do well to watch the lagoons from the area of Georgetown, S. C., up to the North Carolina line, and it is hoped that progress can be reported in future seasons.—ALEXANDER SPRUNT, JR., *National Audubon Society, Charleston, South Carolina.*

First record of Audubon's Caracara in South Carolina.—On the afternoon of May 1, 1943, while driving home from work at the Stark General Hospital where I am stationed, Mrs. Hoyt and I were startled by the sight of an Audubon's Caracara (*Polyborus cheriway auduboni*). We were going toward Summerville, S. C., along the Old Dorchester Road about ten miles from Charleston when we simultaneously noted a large, vulture-like bird soaring and flapping over the road ahead. We stopped and watched it while it fluttered and sailed over the pine trees for about four minutes before gliding down wind and out of sight. It veered and turned many times, swooped, and then flew up and swooped again as it circled above the trees and the road. We had a very fine view of all sides of the bird as it displayed in this manner before us. The large white patches on the wings and the white of the tail were conspicuous in both dorsal and ventral views before the bird finally sailed off. Both of us have seen this bird in its native haunts in Florida

and are familiar with its behavior.—SALLY F. AND J. SOUTHGATE Y. HOYT, *Stark General Hospital, Medical Detachment, U. S. Army, Charleston, South Carolina.*

Phainopepla in Texas.—In a recent article on the Phainopepla (*Phainopepla nitens lepida* Van Tyne) Crouch (Auk, 60: 324, 1943) states that "little can be said for the Phainopepla in Texas." His map (p. 320) indicates only two locality records—El Paso and Eagle Pass.

Seemingly the author overlooked Van Tyne and Sutton's record (The birds of Brewster County, Texas; Misc. Publ. Mus. Zool., Univ. Mich., no. 37: 78–79, 1937) of three specimens of *lepida* from Brewster County. In the Texas Cooperative Wildlife Collections is a young female of *lepida*, taken August 18, 1940, seven miles north of Pine Springs, Culberson County, at 6,900 feet elevation. This locality is at the eastern base of the Guadalupe Mountains about six miles south of the Texas-New Mexico line. Subspecific determination of this specimen was checked by Dr. H. C. Oberholser. Measurements are: wing, 87 mm.; tail, 86.—W. B. DAVIS, *Department of Fish and Game, College Station, Texas.*

Some new records for the Virgin Islands, U. S. A.—LOUISIANA HERON, *Hydranassa tricolor ruficollis*.—An adult male was collected on September 21, 1941, on Krause Lagoon, St. Croix. On May 22, 1943, another adult bird was observed on its feeding grounds, among other species of herons, in Morning Star Swamp.

PUERTO RICO FLYCATCHER, *Myiarchus stolidus antillarum*.—During the course of a recent wildlife reconnaissance on St. Thomas, a discovery was made of a small colony of tyrant flycatchers that had found a last retreat in an extensive ravine leading back about one mile from the seacoast to the southward. I was attempting to force a trail up Bivoni Valley by following the ravine and ran into the greatest difficulty when I reached the steep ascent where the thorn shrubbery of the plains merged with a heavy stand of tall second-growth trees, and an attempt to survey the steeper slopes was frustrated when it was proven impossible to negotiate the impenetrable undergrowth. However, I stumbled onto a small clearing and found my attention centered on a flycatcher perched high up. The unfamiliar call-note and the dark dorsal coloration of the bird caught my attention and I realized that I was scrutinizing this *Myiarchus* for the first time beyond the fringes of Puerto Rico. From my position I could hear about fifteen birds calling. I was not bearing a gun at the time but several days later, on June 10, 1943, I was fortunate in collecting a specimen at the same place. Subsequently I learned to distinguish the plaintive note of this flycatcher above the din of *Elaenia* songs and made an effort to detect the call of *Myiarchus* elsewhere on the island. Several weeks later two birds were heard calling from a wooded slope adjoining the old site of the C. C. C. Camp. The locality is on the north slope of the opposing ridge with a grassland valley intervening, some two miles in expanse. In the light of my findings it would appear that the breeding habits of this *Myiarchus* are not flexible enough to permit the bird to overcome difficulties in the changing environment, and the species is faced with extermination through the increasing difficulty of finding holes in trees sufficiently large for their nests as these small islands become more widely denuded of their older forest growth. The known range of this flycatcher includes Puerto Rico, Vieques, Culebra, and St. Thomas.—HARRY A. BEATTY, *United States Department of Interior, Wildlife Restoration, Christiansted, St. Croix, V. I.*

Lesser Snow and Blue Geese on Southampton Island.—Eskimos report finding, in 1942, a considerable colony of Lesser Snow Geese (*Chen hyperborea hyperborea*)

and Blue Geese (*Chen caerulescens*) nesting at the head of Bear Cove, lat. 63° 35′, long. 84° 15′ on Southampton Island. This colony was not previously known to the Eskimos and it seems probable that it is of recent establishment. In 1936 there was a marked decrease in the number of geese nesting at the Bay of God's Mercy colony compared with 1934 (*cf.* Manning, T. H., Blue and Lesser Snow Geese of Southampton and Baffin Islands; Auk, 52: 158, 1942). The Bear Cove colony may have been established between these two years or it may have been the result of the exceptionally late season at the Bay of God's Mercy in the latter year. According to my informant, the proportion of Blue to Snow Geese in this new colony was similar to that at the Bay of God's Mercy.—T. H. Manning, *Montreal, Canada.*

Connecticut notes.—White-eyed Vireo (*Vireo griseus griseus*). Flight-song; May 29, 1943, Groton, Conn. The bird fluttered up some fifteen feet from the bushes where it had been feeding and, on alighting, immediately resumed its ordinary routine. The performance was not repeated during the ten or fifteen minutes I was able to keep the bird under observation. The song was reminiscent, in tonal quality, of the usual resounding voice of this species but the notes were more softly and sweetly uttered. The range was considerable and the really delightful song seemed to me to be a jumble of ecstatic notes rather than to follow a distinct pattern.

Lincoln's Sparrow (*Melospiza lincolni lincolni*). Unusually early appearance; March 14, 1943, New London, Conn. Two males in full song. Because of the date (the earliest prior date I can find is more than a month later), I give rather full details. Time, mid-afternoon; very strong sunlight; temperature, 54° F.; calm. Place, vacant lot in outskirts of New London. The lot is large and much overgrown with high bushes and weeds. While not far from houses, access to open country without passing close to any is easy. Song Sparrows always winter in this neighborhood and several were singing. Mrs. Stoddard, a professional musician, called my attention to a bird song she had never heard. I failed to recognize it, but perhaps this is understandable as it is five years since I have heard this song. While much shyer than the Song Sparrows with which they were in company, the birds were surprisingly indifferent to my presence and sang several times when only a few feet away, the nearest within three paces. I have seen similar, though not quite so extreme, behavior in New Brunswick. I find this occurrence of peculiar interest because in this region, in recent years, the number of wintering birds has increased and, even more markedly, the number of visitants from the south and west. The date and behavior of these birds strongly suggest that they were winterers.

Song Sparrow (*Melospiza melodia melodia*). Partial albino; May 18, 1943, Waterford, Conn. Head, neck, throat, under part of body dull white except for an almost invisible gray stripe through the eye and two stripes, equally faint, on each flank. Breast-spot pale gray but distinct. The white of the flanks ran upward onto the back. Back light brown, bright in color and without spots or stripes. Wings and tail light gray-brown. Bill rather pale slate. Feet and legs very bright pink. Iris dark brown. The bird was active and apparently in good health but made no sound while under observation.—E. V. Stoddard, *Waterford, Connecticut.*

Meadowlark ranges.—The Fourth Edition of the A. O. U. Check-List (1931, p. 302) is vague as to the eastward limit of the range of the Western Meadowlark. Minnesota is not mentioned, but that state is occupied by this form, "breeding

throughout," according to Dr. Thomas S. Roberts ('Birds of Minnesota,' 2: 292, 1932). In Wisconsin, it is a common summer resident (Wisconsin Birds, Wis. Soc. Orn.: 22, 1942), and in Iowa also is given that status by Philip A. DuMont (Univ. of Iowa Studies, 15 (5): 133, 1934). Otto Widmann ('Preliminary Catalog of the Birds of Missouri': 157–160, 1907) recorded it east to the Mississippi River, and discusses its relationship to the Eastern Meadowlark at some length. For Illinois, no formal list of recent date is available[1] and E. W. Nelson's comment of 1876 (Bull. Essex Institute, 8: 111) is usually quoted. He called the bird "A regular but rather rare summer resident upon prairies." He was writing about the 'Birds of northeastern Illinois' and mentions a specimen taken near Chicago. Manifestly the Check-List statement as to the eastward range—"southern Manitoba south to . . . central Texas"—does not give sufficient recognition to these records, old or new.

The writer became interested in the matter through hearing in territory some forty miles west of Chicago (the Aurora-Plainfield-Joliet region) songs of meadowlarks strongly reminiscent of those of the western race. They had the same rich, oriole-like quality but were not so long sustained as the fullest of the Western Meadowlark's efforts. They may perhaps best be described as having the phrasing (maybe of a little greater length) that is characteristic of the song of the eastern, but the timbre of that of the western, bird. It appears that the difference in song was the character that had most weight in persuading ornithologists to recognize the Western Meadowlark as a distinct species. If song is so important, intergradations in it should be taken into account. In his 'Study of the genus Sturnella' (Bull. Amer. Mus. Nat. Hist., 13: 297–320, 1900), Dr. F. M. Chapman points out the great variability in meadowlark songs. Since the Eastern Meadowlark is recorded from eastern Minnesota to western Nebraska, Kansas, and northwestern Texas, there is broad overlapping of its range with that of the western bird, and in that zone intergradation, at least as to song, occurs. Perhaps the case is similar to that of the Yellow-shafted and Red-shafted Flickers and could be recognized by somewhat similar language in the Check-List.—W. L. McAtee, *Fish and Wildlife Service, Chicago, Illinois.*

Sheld-Duck in North Carolina.—Now that *Tadorna tadorna* is recognized as a Check-List bird, on the basis of capture at Ipswich Bay, Massachusetts, October 15, 1921, it may be of interest to recount the evidence of a considerably earlier occurrence in North Carolina. My informant was Jasper B. White, who had hunted practically all his life on Currituck Sound, and with whom I became well acquainted on several visits to that region. Mr. White was an educated man and a frequent contributor to 'Forest and Stream' over the signatures, "That Reminds Me" and "More Anon." During his young manhood (*circa* 1885), has father had as a shooting guest a wealthy young sportsman, Fred Simmons of Bristol, England. One day during Simmons's stay, about a dozen strange ducks passed White, of which he shot two. In the evening he described his experience to Simmons and showed him the birds which he pronounced 'pink-breasted sheldrakes.' Upon returning to England, Simmons sent White a copy of B. R. Morris's 'British Game Birds and Wild Fowl' which contained a colored plate of the species. In 1909 and in certain subsequent years, I was shown this book inscribed by Simmons to White,

[1] Schantz, 'Birds of Illinois' (Ill. Dept. Conservation, Conserv. Publ., 6: 77, 1928) gives the Western Meadowlark as "S[ummer] R[esident], North gradually extending its range east"; the [Eastern] Meadowlark as "S. R. N[orth] C[entral] S[outhern]."—Ed.

who pointed out the species in question. This reported occurrence seems to me entirely credible and, were I writing on the birds of North Carolina, I should include it.—W. L. McAtee, *Fish and Wildlife Service, Chicago, Ill.*

Interesting Maine records.—Two unusual occurrences for Maine were encountered in July, 1940, by my wife and me. Only July 10, 1940, a Mockingbird (*Mimus polyglottos polyglottos*) was seen near South Brooksville, Maine (on the east shore of Penobscot Bay). We were subsequently informed by a resident there, who had noticed the bird a few days earlier because of its conspicuous song, that it stayed near her house for the following two weeks.

On July 20, 1940, four American Pipits (*Anthus spinoletta rubescens*) were seen on Mt. Katahdin, Maine. They were found together on a rock-strewn meadow slightly above 4,000 feet, about one mile southwest of Baxter Peak on the Appalachian Trail.

The following is of interest because of longevity: a Blue Jay (*Cyanocitta cristata cristata*) was found dead thirteen years after banding; it was banded May 14, 1930, in Madison, Wisconsin, and recovered less than a mile from the place of banding on February 16, 1943 (No. A253073).—Henry Bunting, M. D., *Yale School of Medicine, New Haven, Connecticut.*

Five birds unusual in Arizona.—It has occurred to the writer that record should be made of certain specimens contained in a collection of birds made by Mr. Alex. Walker in Arizona for the Cleveland Museum of Natural History in the period from December 20, 1931, to November 19, 1932. Dr. Harry C. Oberholser has identified this collection, and I am appreciative of his ready courtesy in waiving his privilege of recording the information that follows. Numbers in parentheses are those of the particular specimens as they are listed in the catalogue of the Department of Ornithology of the Cleveland Museum of Natural History.

Anna's Hummingbird (*Calypte anna*).—A specimen with unrecorded sex (No. 39883, C. M. N. H.) the plumage of which, however, is that of a female, apparently adult, was collected at Yuma on December 24, 1931. Munson and Phillips [Condor, 43 (2): 109, 1941] in recording a specimen taken at Patagonia, Arizona, on December 3, 1939, express the opinion that their bird was a late fall transient and state that there are no published winter records from southern Arizona. It would thus appear that this Yuma bird is the first winter-taken specimen to be recorded from southern Arizona.

Northern Flicker (*Colaptes auratus luteus*).—A male (No. 39884, C. M. N. H.) was collected two miles southeast of Portal in the Chiricahua Mountains on October 23, 1932.

Boreal Flicker (*Colaptes auratus borealis*).—A female (No. 29885, C. M. N. H.) taken in the Chiricahua Mountains at a point two miles south of Portal on October 26, 1932, is an example of this large, northern race. It appears to be the first record of the Boreal Flicker from Arizona.

Northern Red-breasted Sapsucker (*Sphyrapicus varius ruber*).—A male (No. 39886, C. M. N. H.) in fresh postnuptial plumage from Pinery Canyon, Chiricahua Mountains, on October 27, 1932, is typical, both in size and in color, of this form and constitutes the first record of this subspecies in the state.

Gray-cheeked Thrush (*Hylocichla minima minima*[1]).—A male (No. 39944,

[1] *Hylocichla minima aliciae* of the A. O. U. Check-list, fourth ed.: see Wallace, Proc. Bost. Soc. Nat. Hist., 41, (6): 238–242, 1939.

C. M. N. H.) in postjuvenal plumage was taken on South Fork of Cave Creek in the Chiricahua Mountains on September 11, 1932. This is the first record of the species for Arizona.—W. EARL GODFREY, *Cleveland Museum of Natural History, Cleveland, Ohio.*

The Great White Heron, an addition to South Carolina avifauna.—Under date of May 17, 1943, Mrs. Frank D. Bartow of New York and Brewton Plantation, South Carolina, informed the writer by letter that "for some time" a large white bird had been feeding on the edges of a pond on the plantation. It was said to resemble the American Egret (*Casmerodius albus egretta*) but a "startlingly large-looking one." Upon examining the bird with a 10-power binocular she found that it had "a thicker head, neck and beak, and the legs not black but yellowish." The latter characteristic was, of course, instantly diagnostic.

On May 29, the writer with his young son and Mr. E. B. Chamberlain of the Charleston Museum journeyed to Brewton Plantation and spent the better part of the day. The bird was in its usual feeding place and excellent views were had of it from distances of about 75 feet and more. The glasses used were 6-, 8-, and 9-power and a 19.5-power telescope. On two occasions, intimate comparisons with both the American Egret and the Ward's Heron (*Ardea herodias wardi*) were possible, as egrets passed the Great White Heron within a few feet, and once a Ward's Heron put it to flight and chased it for some hundred yards! Its great size was plainly apparent, there were no plumes of any kind, the legs were greenish-yellow, and the feet more plainly yellow. From the experience the writer has had with this species on the Florida Keys for several years, he would say that this was an immature individual. Two photographs of the bird were secured.

This is the first observance of the species in the wild in South Carolina, and makes an addition to the state's avifauna. About one hundred years ago, Audubon brought four young Great White Herons up from Florida in captivity, turning them over to his friend, Dr. John Bachman, in Charleston. Brewton Plantation is three miles from the railroad-junction town of Yemasee in Jasper County, the southeastern corner of the state. There had been no atmospheric disturbance of any sort which would account for this bird being blown northward and its occurrence in this state is a complete mystery. South Carolina ornithology is much indebted to Mrs. Bartow for making this momentous discovery and the writer is similarly indebted for the privilege of recording it.—ALEXANDER SPRUNT, JR., *Charleston, South Carolina.*

RECENT LITERATURE

Cuban Ornithology.[1]—In 1923, Dr. Thomas Barbour published his 'Birds of Cuba' which gave an account of the birds of that fertile island as known at that time, with further discussions of the climate, geology, and ornithological history of the region. There were then 273 species and subspecies known from Cuba. In the intervening twenty years there have been various changes in the country, in its avifauna, and in what is known about the birds. The present quarto volume brings this knowledge down to date. There are now 297 species and subspecies on record including certain new species as well as new visitors. Some of the forms have an altered status and have declined in numbers; others are more commonly seen. Dr. Barbour has been a faithful and regular visitor, himself, and is hence in a particularly advantageous position to discuss these matters.

The treatment of the present work is similar to that of the old. The scientific and English names, and occasionally the local vernacular terms, are given, the status of each form in Cuba is discussed, and there are frequent accounts of the birds' characteristics or the author's experiences in searching for them. The earlier chapters on history, geology, and climate have been omitted as needing no repetition or change, but the introductory chapter gives information on alterations in the countryside and the recent development of ornithology and ornithologists on the island. The book thus makes an interesting and welcome addition to the literature of West Indian ornithology.—J. T. ZIMMER.

Bird Watching, a hobby and a science[2]—I wish I could have had this guide when I was a budding ornithologist! How much time and effort it would have saved me! Bird watching is something that has to be learned just like a language or a trade. It is not sufficient to fill the gas tank of your car, seize a pair of field glasses and then cruise the country until you have a list of 125 species or whatever 'record' you are after. The novelty of this type of sport soon wears out; the bird watcher gets bored and takes up another hobby. The obvious need for a guide in this field is perhaps best proven by the fact that J. Fisher's booklet on bird watching, published three years ago in England, sold 100,000 copies in little more than a year's time. There was a demand for a similar book for American bird students and to fill it, Hickey has written this guide.

Beginning with the most elementary advice and ending with suggestions to the veteran expert, it treats in six chapters the following subjects: how to begin bird study; migration watching; bird counting; bird distribution; bird banding; and life history studies. There is included in tables and text a surprising amount of original information. The chapter on bird distribution, for example, is a well-balanced treatment of bird ecology, as indicated by the subtitles: food, cover, water, singing perches, other factors in habitat selection, succession in bird life, life zones, and forest types. A similar, well-classified treatment is given in the other chapters.

Hickey presents his material in a very readable manner, and I feel certain that anybody will enjoy the accounts of the author's adventures on birding trips and the numerous anecdotes about better-known or less-known ornithologists. I, for one, read the entire volume in a single session and so did another bird student

[1] Barbour, Thomas. 'Cuban Ornithology.' Memoirs of the Nuttall Ornithological Club, no. 9, pp. 1–144, 2 pls., August, 1943.

[2] Hickey, Joseph J. 'A Guide to Bird Watching. With illustrations by Francis Lee Jaques and bird tracks by Charles A. Urner.' 8vo, xiv + 263 pp., 41 figs. (6 on end papers), 15 vignettes, 52 tables, 1945. Oxford University Press, London, New York, Toronto. Price $3.50

I know. Some of the more technical information is relegated to five appendices which treat: bird tracks; some results of breeding censuses; an extremely useful outline for a life history study (a classified list of about 350 questions and suggestions); an annotated list of books important to the bird watcher (32 pages); and a list of the local bird clubs in U. S. A. and Canada. In this list I notice the omission of the northern and southern chapters of the Cooper Club. Otherwise I have found very few errors or omissions. The only serious criticism I have is that the publisher charges $3.50 for a book that is so eminently suitable for mass distribution.

It is a volume that should not only be in the hands of every amateur bird student in the country, but which even the expert will read with advantage. We ornithologists believe that the study of birds is the noblest of all hobbies. Hickey shows us how to make our favorite pastime even more useful and enjoyable.—E. Mayr.

Waterfowl in Iowa.[1]—Modern game laws are justifiably specific in their requirement that hunters be able to recognize the birds on which they train their guns. Aside from this fact, many of the hunters, and other persons as well, are interested in the birds for their own sake, and the ducks, geese, and swans receive a considerable share of their attention. The variety of plumages which these birds often show in their seasonal changes and in the differences of age and sex have been the source of much confusion to many observers, and a book is welcome if it helps to resolve some of these difficulties.

To those living in Iowa, the present inexpensive little volume should prove particularly interesting, but its use may well extend beyond the boundaries of that state as the birds herein discussed have their ranges far beyond these boundaries. Thirty-four species and subspecies are accepted as definitely established visitors, including the two debatable forms of Black Ducks, of which more will be said below. Two other species are of accidental occurrence and eight are listed as hypothetical, of questionable record. The established forms are discussed in comparable detail regarding field marks, descriptions of the various plumages, measurements and weights, calls, breeding range, migration, winter range, nesting, food, and status in Iowa. A synoptic key also covers the different plumages and eight good colored plates by Maynard F. Reece are further aids to identification. Shorter notice is given of the accidental and doubtful forms. A systematic list of all North American ducks, geese, and swans serves to place the Iowa birds in the larger series. A glossary of technical terms and illustrations of the topography of a duck and certain morphological details are useful adjuncts. Chapters on variations in the plumage of waterfowl, migration and flyways, enemies, and lead poisoning, and a good index to the volume add to the value of the account.

The supposed two subspecies of Black Ducks are here recognized as distinct, as in the A. O. U. Check-List of 1931. Data have been published within the year (*cf.* Shortt, Wilson Bull., 55: 3–7, 1 pl., Mar., 1943) that will be difficult to refute, showing that the supposed two forms are no more than adults and young of the same form. Since this problem has been the subject of many intense discussions of recent years, it is regrettable that the most recent evidence could not have been presented for the benefit of the readers of this book who may not have seen the original account.

[1] Musgrove, Jack W. and Mary R. 'Waterfowl in Iowa.' 8vo, VIII + 115 + 9 (index), pls. 1–12 (8 col.), 11 vignettes, 1943. State Conservation Commission, Des Moines, Iowa. Price $1.00.

This does not, however, detract from the general excellence of the Musgroves' book which gives a compact presentation of much useful information, in text and illustration, that will be of great service to those for whose use it was prepared.—J. T. ZIMMER.

A monograph on the field behavior of passerines.[1]**—This book is at once an** extraordinarily thorough study of the behavior of one of our most common and familiar species, and at the same time a clear and concise review of the highly scattered literature on the field behavior of passerine birds. On either count it would be a notable contribution to knowledge. Combined in its present form, no field ornithologist can afford to miss it.

The book gradually carries the fledgling Song Sparrow from hatching to maturity and its own cycle of reproduction. Here and there pauses are made, and chapters are given over to some special subject, like innate and learned behavior, the course of development in young passerines, awakening and roosting, pair formation, and territory. An interesting appendix summarizes 21 different vocalizations of the Song Sparrow, tabulates and discusses dominance in six hand-raised birds, lists 12 orders and 16 families of birds in which injury-feigning has been reported, and records miscellaneous items of Song Sparrow behavior. Each chapter carries its own summary. The reader may browse as he wishes, or go over the volume intensively as his fancy suits.

In abundantly demonstrating the results of the observational technique in the field, Mrs. Nice has to some extent under-emphasized the possibilities of field experiments in the study of bird behavior, but the work of others along such lines is given full recognition in the text. The theories and concepts of Lorenz, Tinbergen, and Howard are repeatedly used in interpretations of the phenomena encountered.

The author's studies of behavior in young birds will be a revelation to many. Most of us have heretofore regarded the raising of young birds as a problem for school children rather than a superb opportunity for exploration by ornithologists. Seventy pages are devoted to observations and discussions of this subject. The main account is slow here, as the problems are objectively unfolded, but many episodes will startle a discerning reader. In one incident a brood of Song Sparrows prematurely fled their nest, but "psychologically" remained in it and gave characteristic reactions. On another occasion, a young bird failed to react to its first contact with water, but an hour later went through all the motions of bathing! In the Song Sparrow, five separate stages of development are recognized, and the maturation of 61 activities is here recorded. The appearance of most of these occurs in this species with remarkable regularity. A detailed account of them for five passerines studied by the author is one of the book's most signal achievements and is bound to influence the study of all important life histories of birds in the future.

The chapters on song are perhaps the best in the book and constitute a landmark in bird watching. Over 600 observations on the awakening song of the male are used to show its dependence upon light and other environmental factors. Eight years' study of a large color-banded population disclosed that Song Sparrows did not inherit individual songs from their direct ancestors, nor did they learn

[1] Nice, Margaret Morse. 'Studies in the Life History of the Song Sparrow. II. The behavior of the Song Sparrow and other passerines.' Trans. Linnaean Society, N. Y., 6: viii + 328 pp., September, 1943. Price $2.00 when ordered directly from the Society, c/o American Museum of Natural History, New York, N. Y.

them during the first four weeks of life. "The form, length, timing and even the number of the songs are typical of the species, but not the quality . . . The pattern is innate." Young Song Sparrows were observed to sing when 13 to 20 days old. Frequency of song in adult males of this species reached as high as 325 songs per hour; one male gave 2,305 songs in a single day. During a six-year period, this same bird sang from 5 to 65 days each fall (average 35). The list of species in which females sing now totals 56, and implies the need of more discriminating observations by field-workers. One is impressed with the probability that we now also stand on the threshold of a fascinating series of explorations in which the hormonal control of bird song will be shown for age classes, for the two sexes, and for different species.

Publication of this volume has been achieved in spite of considerable handicaps. Completion of the manuscript actually followed the incidence of a long and critical illness from which the author has not yet recovered. Before final proofs were available, the Linnaean Society's editor (Dean Amadon) was called to military service. As a result, typographical errors have crept into the text at various places; but these do not, I feel, detract from the readability of the book nor its authority. Special attention, moreover, should be called to the publisher's price. Few, if any, bird books today can match it and offer half as much.—J. J. HICKEY.

Audubon's Missouri River journey, 1843.[1]—Apropos of the 100th anniversary of the visit of J. J. Audubon to the upper Missouri River country, Prof. O. A. Stevens of the North Dakota Agricultural College has reviewed, with commentary, the story of his journey. Stevens's account rests upon the well-known Maria R. Audubon and E. Coues edition of 'Audubon and his Journals' (1897), the subject of a critical review by J. A. Allen (Auk, 15: 198–205, 1898). More recently, D. C. Peattie has reproduced portions of the Missouri River journal in his 'Audubon's America.' The object of this expedition was not primarily ornithological but to obtain materials for the 'Quadrupeds of North America.' Nevertheless, five birds were actually found for the first time. Each bears the name of some naturalist-collector and Stevens gives some brief biographical sketches of these, especially if there has not heretofore been much notice given of them in the literature. This commentary is interjected into the running account and appended to the close of the story of the 1843 journey. The whole makes most pleasant reading and contains some historic notes of novelty. In the beginning, Stevens characterizes Audubon as "about the last of the noted travelers" into the Missouri River country. This is true but, in addition to the familiar names which he mentions, there are other lesser known men who contributed to our knowledge of the natural history of the region—William Baldwin, Nathaniel Wyeth, Alexander Gordon, Charles Geyer, J. G. Cooper, and others. Moreover, fur trade was hardly the 'incentive' for many of these naturalist-explorers!

Audubon had just preceded John C. Frémont up the Missouri River. Frémont reached Kansas City on May 17; Audubon had passed there about two weeks before. Frémont had travelled down the Missouri in October, 1842, from the confluence of the Platte to St. Louis. With him was Charles Preuss, "a native of Germany," topographic assistant to Frémont, who also collected plants for him (*cf. Astragalus Preusii* Gray). It was probably Preuss to whom LaBarge referred as "Mr. Prou"—Frémont's, not Audubon's, "botanist"!—a name not identified by Stevens.

[1] Stevens, O. A. 'Audubon's Journey up the Missouri River, 1843.' North Dakota Historical Quarterly, 10 (2): 63–82, 3 pls., April, 1943.

That Audubon was assisted with the plant materials used for the backgrounds of his bird plates by various individuals, for example Joseph R. Mason (*cf.*, Herrick, 'Audubon the Naturalist,' 1: 315, 1917) cannot be news, but the fact that Isaac Sprague (1811–1895) played such an important part in the preparation of the last Audubon plates is heretofore unnoticed. It was this same artist, Sprague, who illustrated Asa Gray's 'Botanical Textbooks' of many editions. Stevens offers some interesting notes on Sprague. That he sketched some of the floral backgrounds for Audubon's last plates (*e.g.*, 485, 488, 490, 493, and 497) there can be little doubt. But, as truly, Audubon apparently did certain backgrounds himself (*e.g.*, plates 486, 489, and 495), for two distinctly different treatments are evident—viz., one artist's interest in botanical exactness for floral detail, when the background actually vies with the bird subject for interest (Sprague's plates) and an artist's effort in giving general impressions of habitat, when the backgrounds are clearly subordinate to the bird subject (Audubon's plates). These plates are unaccompanied by identifications, as were many of the early bird plates, and Stevens attempts to make them for the reader. He finds the drawing of *Malvastrum coccineum* (plate 489) difficult to accept as that mallow but I see no question as to its being that familiar plant. Aside from the brief allusion to the topic of botanical backgrounds of Audubon's plates given by Peattie (*l.c.*: 135), there has been no particular study made of this subject. Herein Stevens's notes on these later plates are a clear contribution to Auduboniana.—J. Ewan, *University of Colorado.*

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CORRESPONDENCE

A. C. Bent's 'Life Histories'

Editor of 'The Auk':—

As a result of numerous enquiries as to when the next number of my series of Bulletins on the Life Histories of North American Birds will appear, I am making a report of progress and presenting a request to your readers. No more volumes in this series are likely to be published during the war. There are, however, two completed volumes in Washington awaiting publication. Another volume is mainly in manuscript here. These three volumes cover all the birds on the 1931 Check-list from the jays to the vireos, inclusive, and will be published *some* day.

I am now gathering material for the 18th volume, which is to include the wood warblers. I am very grateful to all those who have contributed notes and photographs for previous volumes, and am appealing to their generous coöperation in contributing similar material relating to the warblers. The sooner this material is received, the better use can be made of it.—A. C. Bent, *Taunton, Massachusetts.*

A Check-list of Mexican Birds

Editor of 'The Auk':—

For a long time systematists and students of distribution have felt the need of a Check-list of Mexican birds. Indeed, during the past eight years two presidents of the American Ornithologists' Union have urged, through the Research Committee, the preparation of such a list. While large collections of Mexican birds existed in museums on this side of the water, as well as in England and continental Europe, none of them contained a sufficient number of specimens with adequate modern data to make it possible to determine the distribution of so huge an avifauna. However, during the past few years large new collections have been made under the auspices of various public and private American museums. Preliminary work on a check-list has been in progress for some years by the chairman of the undersigned group, which has now agreed to push the work to completion.

As this will be the first Check-list of Mexican birds, we fully realize it may contain many errors and a revised edition may be required at a fairly early date. In fact, we are properly conscious that one of the chief results of this work will be the opportunity it will give to all interested persons to point out imperfections and additional facts, so that a subsequent edition may be a great improvement. It is hoped that all workers in the Mexican field will coöperate with the undersigned. As soon as a preliminary draft of the manuscript is ready, criticism will be invited. All correspondence should be addressed to the chairman.

Due to the amount of new material available, it is hoped that it will be possible to give, with some attempt at detail, the distributions of many of the forms, but where this is not possible, definite statements to that effect will be made. For common names both English and Spanish will be employed. The undersigned are much pleased that Dr. Rafael Martin del Campo of the Instituto de Biologia of Mexico City has agreed to supply the Spanish names, a task he is better qualified to undertake than anyone else.—Herbert Friedmann, Ludlow Griscom, Robert T. Moore (*Chairman*).

Birds Occurring at Higher Elevations in the Northern Portions of Their Ranges

Editor of 'The Auk':—

Mr. J. Charles Tracy's interesting notes (Auk, 60: 591–593, 1943) on the occurrence of wood thrushes at relatively high situations in the extreme northeastern portion of the species's range is accompanied by the statement that he has "been unable to find reference anywhere to any species whatever which moves into higher altitudes as it moves northward." Such occurrences are frequent among birds of southern association which occupy certain areas of the southern and central Appalachian highlands.

Swainson's Warbler (*Limnothlypis swainsoni*) offers a notable case in point. Brooks and Legg (Auk, 59: 76–86, 1942) have recorded the regular summer occurrence of this species in West Virginia at latitudes north to 38 and 39 degrees, and at elevations from 1500 to 3000 feet. They have also reviewed the recorded occurrences of these birds at other points in the Appalachian Mountains, in North Carolina, Tennessee, and Virginia. In every case where the birds have been found north of, or away from, the south Atlantic coastal belt which has long been regarded as their normal habitat, they have been in mountainous regions. One West Virginia breeding locality is nearly two degrees of latitude north of the most northern point (Tangier Island, Virginia) at which the birds have been found on the Atlantic coast. At this West Virginia station the birds inhabit dense tangles of rhododendron and hemlock on the Allegheny Plateau.

Bachman's Sparrow (*Aimophila aestivalis bachmani*) is another species whose distribution exhibits the same tendency. In West Virginia and western Maryland, where the bird is nearing its northern limits in the central portion of its range, it regularly occurs up to elevations of 3000 feet, and is, seemingly, more common in elevated situations than in river valleys. In the Great Smoky Mountains it has been recorded at elevations up to 5000 feet. Bewick's Wren (*Thryomanes bewicki bewicki*) follows the same pattern, since in West Virginia (where it is near its northern limits in the Appalachian region) it is common to abundant at elevations from 1500 to 3500 feet, and even occurs regularly up to the red-spruce forest at 4000 feet. It is rare in, or entirely absent from, the less elevated river valleys, where its place is taken by the House Wren.

Hypotheses suggested by Mr. Tracy to account for the behavior of Wood Thrushes northward will not apply in the three cases cited above. In each instance the elevated habitat north of the general centers of distribution is very different in physiography, and in its biota, from the more heavily occupied areas to the south. Nor can this behavior trait be explained on the basis of racial differentiation in the examples given above. Careful investigation in each case has failed to show morphological grounds for setting up new northern races of the birds under discussion. It is difficult also to think of interspecific competition as furnishing the whole answer, particularly in the case of Swainson's Warbler. Here in the mountains we have a disjunct population separated by some hundreds of miles from any other known occupied territory.

The geologic age of the Appalachian system of course precludes the suggestion that the birds are still occupying favorable niches in a territory through which they were more generally distributed before the Appalachian revolution. I have been unable to find any answer to this problem which satisfies me, and have regarded it as another evidence of the need for further study in an area which,

despite the work already done, still holds more than its share of biological loose threads.

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EDITOR OF 'THE AUK':—

I was glad to see in last October's 'Auk' a note by J. Charles Tracy on the extension of the breeding range of the Wood Thrush. This interesting ornithological event has not received the attention it deserves, but it is only fair to the field workers to point out that it has not been entirely overlooked, and also that it began much earlier than Mr. Tracy supposes. Without attempting an exhaustive review of the literature I may call attention to Glover M. Allen's 'List of the Birds of New Hampshire' (Proc. Manchester Inst. of Arts and Sciences, iv, 1902, Manchester, N. H., 1903), where records of ten individuals occurring in the White Mountains are given, dating from 1894 on—records which could now be added to very extensively. For Vermont, I myself recorded in 'The Auk' (1908, p. 63) the finding of four or five singing at Willoughby Lake in 1896 and of nine at West Bridgewater at elevations ranging from 1100 to 2000 or 2500 feet in 1907, and there cited Howell's record for Mt. Mansfield in 1899 and Torrey's for the Canadian side of Lake Memphremagog in or before 1885. I could cite more recent records for both New Hampshire and Vermont, but my purpose is only to call attention to these earlier ones.

I cannot be so sure as Mr. Tracy seems to be that the northern-nesting Wood Thrushes tend to seek higher altitudes than those that breed farther south. At any rate my singing birds of 1896 at Willoughby Lake were all near the head of the lake and hence at an altitude of only about 1200 feet, or as low as they could get and nest in the neighborhood at all. Dr. Walter Faxon had found a single singing Wood Thrush there in 1885 and again in 1889, but I did not learn this till after my visit and I was as much surprised to find the species there as was Mr. Tracy on his later visit. In an article that appeared in the St. Johnsbury (Vt.) Caledonian, September 11, 1896, I mentioned Faxon's experience and added as a possible explanation of the increase in numbers: "The fact that four or five, probably representing so many pairs, were heard this year is perhaps due to the scarcity of Hermit Thrushes, which were seriously decimated in the South in the winter of 1895, and which have not yet recovered their normal abundance. Dr. Faxon and Mr. Ralph Hoffmann found last year (1895) that the Wood Thrushes were taking the places left vacant by Hermits on the side of Mt. Greylock in Massachusetts and far above their ussual limit of altitude. Mr. William Brewster also writes me that he found a Wood Thrush at Lake Umbagog this spring for the first time, and he thinks these birds are extending their range northward." Lake Umbagog, by the way, lies northeast of the White Mountains, partly in Maine and partly in New Hampshire, and at an elevation of about 1600 feet. This remained Brewster's only record for the species at Lake Umbagog in an experience beginning in 1871 and ending in June, 1909. (See his 'Birds of the Lake Umbagog Region of Maine,' Bulletin Mus. Comp. Zoöl., vol. 66, part 3, 1937.)

There is no doubt that the Wood Thrushes do ascend the mountainsides farther than might be expected, but in northern New England they are by no means con-

fined to such altitudes, as is shown by my experience at Willoughby Lake. Thus, although I was surprised to hear one singing at 3900 feet on Mt. Mansfield in Company with Bicknell's Thrushes (1926), I was only gratified to hear one at 1200 feet at South Tamworth, N. H., from the same piazza where I heard Hermits, Olive-backs, and Veeries. The 'apparent desire to remain aloof from the civilization' that struck Mr. Tracy as unusual in his Willoughby Lake birds would not so impress a New-Englander, since the Wood Thrush is not the dooryard bird even in southern New England that it is farther south. Though the woods in my neighborhood abound in Wood Thrushes in season, I have only once had a pair nest near my house. That was in the summer of 1939, and the experience has not been repeated though the conditions remain the same and this year a male sang there for eight days before giving it up.

In considering this matter of the altitudinal range of this species it should be remembered that the Wood Thrush is only irregularly and locally distributed in northern New England and that the general altitude of the terrain is fairly high, much of it over 1000 feet even in the valleys, so that to spread into the region at all the bird must be not averse to fairly high altitudes; but that does not prove that it actually prefers them to the lower elevations. I cannot help wondering, too, whether the Wood Thrush avoids the higher altitudes in the Southern States as much as Mr. Tracy indicates. I cannot speak from personal experience on that point, but I note in Wetmore's 'Observations on the Birds of West Virginia' (Proc. U. S. Nat. Mus., 84, No. 3021, 1937) a record of one taken at 3300 feet at Cranberry Glades, June 12, 1936, and in the same author's 'Notes on the Birds of Tennessee' (Proc. U. S. Nat. Mus., 86, No. 3050, 1939), records of specimens taken at 5100 and 2700 feet in the Great Smoky Mountains; the one obtained at 5100 feet was a juvenile only recently from the nest. May it not be that the choice of a nesting place is a matter of local conditions rather than of altitude? The Wood Thrush is undoubtedly a bird of deciduous growth, as Mr. Tracy says, not of coniferous forest, and it prefers saplings in which to nest.

FRANCIS H. ALLEN

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OBITUARIES

ARTHUR HUMBLE EVANS, an Honorary Fellow of the American Ornithologists' Union, died at his home, Cheviot House, Crowthorne, Bucks, England, March 28, 1943, at the age of 88. He was born at Seremerston, Northumberland, February 23, 1855, the son of Rev. Hugh Evans, vicar of that parish. While a student at Durham School he met Canon Tristram, who encouraged him in his interest in birds and plants. Having obtained a scholarship at Clare College, Cambridge, he became acquainted with W. A. Forbes and Professor Alfred Newton and received his degree in 1879. For some years after graduation, he remained at Cambridge teaching and coaching. In 1905 he visited South Africa and in 1914, Australia, and published accounts of his trips in 'The Ibis.' After his retirement in 1928 he settled at Crowthorne for the rest of his life.

Evans was an excellent classical scholar and possessed a gift for writing. In his earlier years he contributed papers to the 'Scottish Naturalist,' 'Annals of Scottish Natural History,' and 'The Ibis,' of which last he was joint editor, with Dr. P. L. Sclater, for two series, 1901–1912. He collaborated with S. B. Wilson in the publication of 'Aves Hawaiiensis' (1890–1899), and with T. E. Buckley in 'A Vertebrate Fauna of the Shetland Islands,' and contributed a section on 'Birds of the County' to Marr and Shipley's 'Handbook to the Natural History of Cambridgeshire' (1904), and a 'History of the Fen District' to a volume 'On the Natural History of Wicken Fen' (1923). His best-known books include the comprehensive volume on 'Birds' in the Cambridge Natural History (1899); a translation (1903) of '[William] Turner on Birds . . . noticed by Pliny and Aristotle,' originally published in Latin in 1544; 'A Fauna of the Tweed Area,' in Scotland (1911); and a work on the 'Birds of Britain' (1916). His last publication appeared in 'The Ibis' in 1930.

At the time of his death, Evans was the oldest member of the British Ornithologists' Union, which he joined in 1879; and he was an original member of the British Ornithological Club. He was elected a corresponding member of the A. O. U. in 1899 and was made an Honorary Fellow in 1917.—T. S. PALMER.

AXEL JOHAN EINAR LÖNNBERG, an Honorary Fellow of the American Ornithologists' Union, died at Stockholm, Sweden, December 21, 1942, at the age of 77. He was the son of a Member of Parliament and was born at Stockholm, December 24, 1865. He attended the University at Upsala, where he received the degrees of Bachelor of Science in 1887 and Doctor of Science and Fellow of the University in 1901. During the next twelve years he served as Inspector of Fisheries. In 1903 he received an appointment as chief of the Natural History Department of the Museum at Gothenburg but only remained six months when he was made Professor of the Vertebrate Department of the Royal Natural History Museum in Stockholm, a position he occupied until he retired in 1933. After retirement he still continued his work until his death.

Lönnberg was an all-around naturalist. In his earlier years he took a degree in botany and devoted considerable time to researches in invertebrate zoology, including tapeworms, scorpions, and squids, before taking up the vertebrates. He had an intimate and personal knowledge of the natural history of his own country, and in the course of his extensive travels, he visited the Caspian basin in 1899, British East Africa in 1910–1911, and Florida in 1922–1923.

In 1916 he was elected a Corresponding Fellow, and two years later an Honorary Fellow of the A. O. U., and in 1922 an Honorary Member of the B. O. U. He was

a frequent contributor to 'Fauna and Flora' and other periodicals. In 1925 he prepared a paper which was presented before the A. O. U. meeting in New York and published in 'The Auk' in 1926, giving a valuable review of the Swedish National Collection of Birds from its foundation in 1770 down to date. In this review he showed the development of the collection under various curators, at first in the care of the Academy of Sciences and later when it was taken over by the Government. It was installed in its present quarters in 1908. Among Lönnberg's more important papers on birds were 'The Origin of the North American Ornithic Fauna' (1928) and 'The Development and Distribution of the African Fauna in Connection with Climatic Changes' (1929).

Dr. Lönnberg took an active part in conservation of wild life. He was Chairman of the Swedish Section of the International Committee on Bird Protection and was especially interested in the preservation of European waterfowl. At the International Ornithological Congress in Copenhagen in 1925, at the conference in the Foreign Office in London in 1927, and at subsequent meetings, Lönnberg did everything in his power to bring about regulations for shorter open seasons, more reasonable bags and greater protection during migration for ducks, geese, and swans. Personally he was most companionable and, in the words of one biographer, was "beloved as a man and honored as a zoologist."—T. S. Palmer.

Bayard Henderson Christy joined the American Ornithologists' Union in 1922, and was honored by election to the class of Member in 1931. He died of a heart attack in Sewickley, Pennsylvania, on June 20, 1943, in his 72nd year. He was born in Sewickley on April 21, 1872, the son of George Harvey and Sarah Marshall Christy. A member of one of Sewickley's oldest families, he received his earlier education in the town of his birth, was graduated from Williams College in 1894 and from Harvard Law School three years later, and was admitted to the bar in 1897.

He promptly entered the field of patent law, practicing with his father and his elder brother, the late Marshall Christy, in the Pittsburgh firm of Christy and Christy. In this field he continued throughout his life. At the time of his death he was head of the firm of Christy, Parmelee and Strickland. He won high standing in his profession, being for a time the president of the Pittsburgh Patent Bar Association.

A scholarly man and careful student of history, literature, and fine arts, Mr. Christy was the president of the Pittsburgh chapter of the Foreign Policy Association, president of the Sewickley Library Board, and president of the Sewickley School Board. He served the Sewickley Presbyterian Church as trustee and elder for many years, and taught a bible-study class there. He was a trustee and, for many years, the president of the Sewickley Y.M.C.A. Under Y.M.C.A. auspices he went to Russia during the First World War to help in organizing relief for the starving population. On his return to the United States, he devoted himself to a study of constructive national policies and in 1932 became the first chairman of the Sewickley Committee on Education in the Ways of Peace. With the subsequent outbreak of hostilities in Europe he helped to carry relief to prisoners of war and to outraged countries through whole-hearted support of the American Friends (Quaker) Service Committee. Ever sympathetic and thoughtful, he devoted himself unstintedly to good works such as these. He was a member of the Cosmos Club of Washington, the Harvard Club of New York, and Delta Kappa Epsilon fraternity.

He was a careful student of birds, not only those of his own beautiful country-

side, but of many other parts of Pennsylvania, notably Pymatuning Swamp and Cook Forest; of the Huron Mountain Club's preserve in the Upper Peninsula of Michigan; of Ohio, Florida, California, and certain parts of Europe. In California he had the memorable experience of observing Condors from an airplane. He was for years president of the Audubon Society of the Sewickley Valley. He addressed a meeting of that organization on his own lawn a few days before his death. He was active in assisting other ornithologists in their work—notably W. E. Clyde Todd, to whose 'Birds of Western Pennsylvania' he contributed—and A. C. Bent, for whose 'Life Histories' he wrote an article on the Pileated Woodpecker. He was author of two books: 'Going Afoot'—a treatise on walking techniques; and 'The Book of Huron Mountain.' His ornithological library was unusually fine. Most of his books he sold just before his death, giving the proceeds to the Friends Service Committee for Relief of War Sufferers.

Mr. Christy was a lover of birds in the best sense of the phrase. He had a profound interest in, and grasp of, the work of professional ornithologists, and in editing 'The Cardinal,' the semi-annual organ of the Audubon Society of the Sewickley Valley, he showed not only his great literary ability, but his understanding of scientific problems as well. This magazine came to be unique among our bird journals because of its literary flavor and handsome format.

Mr. Christy wrote beautifully, and read beautifully. Papers he presented at meetings of the American Ornithologists' Union will long be remembered for their clarity, their smooth-flowing quality, and their artistic worth. He was a bibliophile with the soul of an artist, and he was also a philologist. The combination of these three viewpoints gave rare force and charm to his writings. Those who were privileged to know him will treasure his letters as examples of fine English prose; will smile as they recall happy incidents on long bird hikes or boat trips; will feel lasting gratitude for his friendship.—George Miksch Sutton.

Norman Asa Wood, Member of the American Ornithologists' Union since 1912, died at Ann Arbor, Michigan, on September 7, 1943. He was born in Lodi Township, Washtenaw County, Michigan, on August 19, 1857. His first contact with organized ornithology was in 1884, when he became one of J. M. Wheaton's corps of volunteer recorders of bird migration. This subject remained one of his principal interests, and he eventually published, with A. D. Tinker, a report on fifty years of bird migration in the Ann Arbor region. In 1895 he came to the University of Michigan Museum to work as taxidermist under Dean C. Worcester. Mr. Wood never had any formal training in zoology, but his keen interest in birds and mammals, his capacity for steady, effective work, and his devoted loyalty to the University Museum and its leaders made his long career a very fruitful one.

Mr. Wood was appointed Curator of Birds in 1911 and also had sole charge of the collection of mammals until 1919, when a separate curator was appointed. In 1932 he retired and was made Emeritus Curator of Birds. In 1937 the University of Michigan conferred upon him the honorary degree of Master of Science. He was one of the leading members of the Michigan Ornithological Club, serving as Associate Editor (1897 and 1905) and Vice-President (1904–1905).

Perhaps his best known ornithological work was his discovery in 1903 of the breeding ground and the first nest and egg of the rare Kirtland's Warbler, of which only about twenty-two specimens had ever been taken in the United States. Other Michigan field trips followed, and in the ensuing thirty years Mr. Wood made more than twenty-five expeditions to key locations, collecting specimens and

gathering distributional data on birds and mammals all over the state of Michigan—from the marshes of Monroe County to Whitefish Point, and from Isle Royale to Berrien County. In 1921 he carried on a season's work in North Dakota and later published a report on the state's avifauna. He spent nine months in 1923–1924 at Ginling College, Nanking, China, teaching ornithology and establishing a natural history museum.

The University of Michigan Museum of Zoology is preparing for publication Mr. Wood's book on the birds of Michigan; it will also publish a bibliography of his scientific contributions—some sixty notes and papers on birds and eighteen on mammals.—JOSSELYN VAN TYNE.

WALTER BEICK, an Associate of the American Ornithologists' Union, elected in 1932, died in the Gobi Desert, Mongolia, March 25, 1933, at the age of 52. He was born October 1, 1883, in Werro, Esthonia, then one of the Baltic provinces of Russia, and was descended from a Baltic family which came from Sweden long ago. He was educated in the German Russian Gymnasium of Dr. Widemann in St. Petersburg (now Leningrad), the Forestry Academy at Eberswalde, Germany, and the University of Munich. After completion of his studies he returned home and was active in the forest service.

During the first two years of the First World War he was an officer in the Russian army and was wounded on the German front. Unfit for military service, he went to Russian Turkestan to recuperate where, in 1916, he made hunting and collecting trips from Werny as a base to the Ala-tau Mountains. In August of the same year he was made leader of a Commando expedition against the Kirghiz and other nomadic tribes. In February, 1917, he was in Prezewalsk, now Kasakol, on Issy-Kul Lake. In the following year he applied for a position in the forest service and was made a supervisor of the Sepsinsk region, an area of about 400 kilometers from east to west. Because of the war, regular work was suspended and for a year he became Director of the Forest School in Werny. He then became Director of the Provincial Museum and organized expeditions chiefly for big game to the Tien-shan Mountains where he spent about two months each year among the glaciers and alpine meadows. In 1920, on account of attempts on his life, Beick had to pay the Bolsheviks a ransom of everything he had, including his collections, and flee to Chinese Turkestan. For the first year, life was difficult. Occasionally he was forced to live on bread and tea for a month at a time but he continued to eke out an existence by hunting and fishing. Finally through a Belgian missionary he obtained means from home which made it possible to continue work and send collections to museums in Berlin, Amsterdam, and Copenhagen.

In 1925, through Dr. Paul Matschie, the Director, arrangements were made to collect for the Berlin Museum and in March of the following year he proceeded to Ebi Nor at the mouth of the Dorotala River. At the end of March, 1927, Beick was in Siningfu where he met Dr. Wilhelm Filshner, the German traveler, who intended to cross the Gobi Desert to Kassou in China and then go on to Tibet. He spent the summer and autumn of 1927 and the first three months of 1928 in the South Tetung region studying birds, and then for several months was ill at a missionary station. On account of unsettled conditions in the country, long trips were impracticable and in March, 1929, he reported that he had been able to collect only in the immediate vicinity of his camps. With Friedrich Wagner, a Saxon traveler, he went on to Lake Koku Nor and a year later reached Sining

where he remained for two years, thus making a total of four years which he spent in Kansu. In December, 1932, he met Dr. Birger Bohlin, a Swedish palaeontologist of the Sven Hedin Expedition, and a few weeks later was in the camp of Dr. Hoerner near Tsago Nor. Finally he decided to accompany Dr. Bohlin to Peking and then return to Germany and Esthonia. Unfortunately, after a complete nervous breakdown, he committed suicide while en route in camp at Wajan Tori on the Edsin Gol.

Beick was a man of rugged constitution, great determination, and was able to endure great physical hardships. His one ambition in later years was to make as complete a collection as possible of the birds of central Asia and have them worked up by Dr. Stresemann of the Berlin Museum. Even though tempted by liberal offers when sorely pressed for the necessities of life, he steadfastly refused to dispose of any collections. His perseverance was rewarded and his ambition finally achieved, although posthumously, by the publication by Stresemann, Meise and Schonwätter of an extended report on his collections under the title 'Aves Beickianae' in the 'Journal für Ornithologie' for 1937, pp. 375–576. In this report may be found a biographical sketch of Beick, accompanied by his portrait.—T. S. Palmer.

Lieut. Robert Charles McClanahan, an Associate of the American Ornithologists' Union, elected in 1941, died of pneumonia followed by cerebral hemorrhage, at Camp Butner, North Carolina, May 6, 1943, at the early age of 30. He was the son of Max and Nellie Arnott McClanahan and was born at Farmersburg, Indiana, March 23, 1913. He was educated in Florida where he graduated from the University of Florida in 1934 with the degree of B. S. in Education. He also took summer courses at the University of Michigan. While still an undergraduate student, he was employed as part-time instructor and for three years after graduation he was instructor in biology in the high school at Pensacola, Florida.

On April 1, 1937, McClanahan entered the service of the Biological Survey as Assistant Biological Aid. A month later he was appointed Junior Biologist and he was an Assistant Biologist prior to his appointment as a Lieutenant in the army in January, 1942. His duties in the Biological Survey (later the Fish and Wildlife Service) were chiefly connected with bird banding in the section of Distribution and Migration of Birds. In the summer of 1940, and again in 1941, he was detailed to field work in southern Canada and traveled some thousands of miles in the Prairie Provinces of Manitoba, Saskatchewan, and Alberta. From 1937 to 1942 he published several notes in 'The Auk,' chiefly on the occurrence of certain unusual species of birds in Florida. His publications also included two wildlife leaflets: 'Protecting Blueberries from Damage by Herring Gulls,' and 'Original and Present Breeding Ranges of Certain Game Birds in the United States,' 1940.—T. S. Palmer.

Philip Nelson Moulthrop, an Associate of the American Ornithologists' Union since 1940, died at the Cleveland Clinic, Cleveland, Ohio, August 21, 1943, in his 32nd year, from an attack of meningitis. He was the son of Mr. and Mrs. Raymond J. Moulthrop and was born in Erie, Pennsylvania, November 18, 1911. He was a graduate of the Cleveland Heights High School and attended Syracuse University. He joined the staff of the Cleveland Museum of Natural History more than ten years ago as an assistant in the department of mammalogy and in the spring of 1943 was made Assistant in Charge. For a young man of his age he had considerable experience in field work, having been a member of the Museum ex-

peditions to Saline Valley, California (in 1934), Anticosti Island in the Gulf of Saint Lawrence (in 1937), the Eastern States Expedition (in 1939), the Corning Expedition to South Carolina (in 1940), the Corning Cuban Expedition (in 1941), and various short trips to southern and western Ohio.

Moulthrop was interested in mammals, reptiles, and fishes as well as birds, was the author of several papers, mainly on mammals, and had undertaken mammal surveys at the Holden Arboretum in the Kirtland Hills near Cleveland. He was a member of the American Society of Mammalogists, President of the Kirtland Mammal Club, member of the Cleveland and Kirtland Bird Clubs and Councilor of the Kirtland Reptile Club. He was the herpetologist of the Museum and did much of its aquarium work. Shortly before his death he had returned from Owens Valley, California, where he had gone to arrange for the care, during the war, of a pack outfit of some 70 burros belonging to the Museum, which was maintained for work in the Sierras. He continued his work at the Museum until two days before his death. He is survived by his wife, Katherine Moulthrop, a son Daniel, his parents and two brothers, Edward A. of Atlanta, Georgia, and John M. Moulthrop of Cannonsburg, Pennsylvania.—T. S. Palmer.

Dr. Frank Richard Oastler, an Associate of the American Ornithologists' Union, elected in 1930, died suddenly from a heart attack at the Many Glaciers Hotel in Glacier National Park, Montana, August 2, 1936, at the age of 65. Accompanied by his wife, he had spent several weeks in the park photographing mountain goats and other wild life and had planned to leave soon for Alaska to continue his photographic work.

He was the son of William Churchill and Frances Macnee Oastler and was born in New York, July 19, 1871. The first seven years of his life were spent in England, and then he returned to the United States. He graduated from Yale University in the class of 1891 and received his degree in medicine from the College of Physicians and Surgeons of Columbia University in 1894. He practiced surgery for more than forty years and was Professor of Surgery at Columbia University from 1912 until he reached the retirement age in 1932. At the time of his death he had a large private practice as a gynecologist and obstetrician and was head of the department of gynecology of the Lenox Hill Hospital in New York.

About 1911 Dr. Oastler began making expeditions every summer to observe and photograph scenery, flowers, and various forms of wild life, and soon developed unusual skill with his camera. In due course of time he brought together a notable collection of photographs, both 'stills' and motion pictures, and occasionally gave most interesting talks, illustrating and describing enthusiastically his experiences in the field in the course of his travels.

Dr. Oastler was deeply interested in practical conservation of wild life. For eight years prior to his death he served as a Director and Second Vice-President of the National Association of Audubon Societies. Active and aggressive, he could always be counted on to support any worth-while project for protection of birds, big game, or National Parks. He visited many of these areas in the West, spent several weeks at Mount McKinley National Park in Alaska and served on the Advisory Board of the National Park Service. He was particularly interested in the movement to create the Isle Royale National Park in Lake Superior and took an active part in supporting the bill for its establishment.—T. S. Palmer.

Russell Richardson, II, a former Associate of the American Ornithologists' Union, was burned to death in the early morning of Sunday, May 10, 1942, in

his home at Lake Atsion, seven miles north of Hammonton, New Jersey. He was born December 28, 1906, at Newtown, Bucks County, Pennsylvania, the eldest son of Russell Richardson, M. D., and Marion Eastburn Briggs. He was educated at the William Penn Charter School in Philadelphia and at Princeton University, whence he was graduated in 1928 with the degree of B.S. Soon after leaving college he entered the investment banking house of Battles & Co. in Philadelphia, where he rose to be chief statistician; shortly before his death he joined Buckley Brothers of Philadelphia in the same capacity. In 1928 he married Frances Redfield of New Hope, Bucks County, Pennsylvania, and by her had two sons, Russell, III, and Edward Redfield, both of whom survive him. The first union ending in divorce in April, 1939, he married Mrs. Elizabeth Greenwood, who, with her seven-year-old son by a former marriage, perished with him.

Richardson's lifelong pleasure in camping, shooting, fishing, and the observation of wild life was developed early through the influence of his mother's brother, a lover of the outdoors. During four years at Princeton he was the writer's constant companion in the study of birds and plants and Richardson's Ford coupé made it possible to explore the beaches and barrens of New Jersey during the college year and to seek out new birds as far away as South Carolina, Texas, and Colorado during the long vacations. His longing for the woods led him to leave Philadelphia and take up residence in the log cabin on Lake Atsion two years before his death.

Although his connection with the Union lasted only from 1924 to 1931 or 1932, the latest letters received from him testified to his continued interest in the Pine Barren fauna and flora amidst which he lived. His publications in the ornithological field consist of two General Notes in 'The Auk' for 1926 and he is mentioned as a contributor to the first part of Bent's 'Life Histories of North American Shore Birds.'—H. G. Deignan.

Boyd Packer Rothrock, an Associate of the American Ornithologists' Union for eight years, died in Harrisburg, Pennsylvania, July 29, 1939, at the age of nearly 71, after an illness of more than a year. He was born in Williamsport, Pennsylvania, Sept. 22, 1868. In 1904 he was entrusted with the preparation of the exhibit of the Pennsylvania State Board of Agriculture at the St. Louis Exposition. After the Fair this exhibit was taken to Harrisburg and became the nucleus of the State Museum, established in 1906. Dr. Rothrock was made Curator and remained in charge of the Museum for 26 years until his retirement on Feb. 1, 1933.

During this time, in 1925, while actively engaged in natural history work, he was elected an Associate of the A. O. U. and maintained his membership until he retired. He was also a member of the Harrisburg Natural History Society, the Bird Society of Dauphin County, the Lycoming Natural History Society, the Harrisburg Sportsmen's Association, and other organizations. He was survived by a sister, Mrs. Sarah R. Dunne of Detroit, Michigan, and a niece, Mrs. Helen B. Achorn of Miami, Florida.—T. S. Palmer.

Oscar Perry Silliman, a Life Associate of the American Ornithologists' Union, elected at the San Francisco meeting in 1915, died in his 67th year in Salinas, California, May 9, 1943. He was the son of Wyllys Augustus and Martha Ann (Gilman) Silliman and was born two miles from Watsonville, Santa Cruz County, California, October 1, 1876. He attended the grammar school and graduated from the high school in Watsonville in 1895 but spent the greater part of his life in the adjacent county of Monterey. He taught grammar school from 1896 to 1900, then engaged

in farming until 1907, when he entered the feed and grain business, and later the bean business, in Salinas. He concentrated his attention on the birds and mammals of Monterey County and his papers comprise four notes in 'The Condor' in 1915 and one, with J. C. von Blocker, Jr., in the same journal in 1937.

Silliman had an unusually fine ornithological library, which was said to include nearly everything relating to the occurrence of birds in California. In fact, his energies seemed to have been directed toward the acquisition of the published works of others rather than publishing the results of his long and intimate acquaintance with the species found in the vicinity of Monterey Bay. He joined the Cooper Ornithological Club in the first year of its activity, became a life Member in 1937 and a life Associate of the A. O. U. in 1940, and joined the American Society of Mammalogists in 1924. He also aided zoological work by contributing funds for publication and by employing field collectors to carry on organized explorations in Monterey County. He is survived by his wife, Mathilda Neal Silliman, whom he married in 1897, and by several children and grandchildren.—T. S. Palmer.

Edward Sturtevant, an Honorary Life Associate of the American Ornithologists' Union, died after a long illness at the age of 63, at his home in Middletown, Rhode Island, January 16, 1939. He was born in Newport, Rhode Island, in 1875, the son of Eugene and Mary (Clark) Sturtevant and was a member of a family prominent in the early history of New England. He attended the Rogers High School in Newport, graduated in 1898 from the Massachusetts Institute of Technology, and in 1907 received the degree of M. S. from Harvard. Almost immediately after his graduation he became associated with St. George's School in Newport, where he taught physics and remained on the faculty more than forty years. In 1902 he married Miss Theodora Van Horn, who survived him together with their two sons, Theodore Clark and Edward, Jr., and a daughter, Mrs. Horace Bueney, Jr.

Sturtevant evidently became interested in birds at an early age and in 1896 was elected an Associate of the A. O. U. He is best known as the junior author of Howe and Sturtevant's 'Birds of Rhode Island,' 1899, an annotated and well-printed list of 291 species then credited to the state. It was reviewed in 'The Auk' for 1900 and elicited high praise from the Editor, Dr. J. A. Allen. In 1903 the same authors published a brochure of twenty-four pages containing 'A Supplement to the Birds of Rhode Island,' bringing the knowledge of the avifauna up to date. It contained a 'Revised Annotated List' of 283 species together with 3 extirpated and 8 hypothetical species. Although the total number of species was the same as that in the original list, several of those mentioned in 1899 were dropped and 5 others were added.—T. S. Palmer.

Leslie Wheeler of Lake Forest, Illinois, an Associate of the American Ornithologists' Union, elected in 1934, died in Florida, February 27, 1937, in his 45th year. He was the son of Charles Pinckney and Martha (Seymour) Wheeler and was born in Evanston, Illinois, May 27, 1892. He graduated from Yale University in the class of 1914, and after several years in business with the firm of Pickands, Brown & Co., devoted his energies to social service and charitable work.

He became interested in Field Museum of Natural History about 1933, when he began to develop the collection of birds of prey. During the next few years he presented more than a thousand of these birds to the collection, became Research

Associate in the Division of Birds and a member of the Board of Trustees of the Museum. Just before his death he completed a revision of a group of South American wood owls. Two of his papers have appeared posthumously: A brief note on the occurrence of the King Eider on the Illinois River, in 'The Auk' for July, 1937, and a description of a new wood owl (*Strix rufipes sanborni*) from the island of Chiloé, Chile, in the Field Museum 'Zoological Series,' No. 37, December 31, 1938.

Mr. Wheeler was highly regarded by his associates on account of his scientific work, his scholarship, and his charming character. In addition to holding membership in the Union, he was a Fellow of the American Geographical Society. He was survived by his widow and two sons, Leslie, Jr., and Harry Wheeler.—T. S. PALMER.

THE SIXTY-FIRST STATED MEETING OF THE AMERICAN ORNITHOLOGISTS' UNION

BY LAWRENCE E. HICKS

THE sixteenth meeting to be held in New York City took place October 20, 1943. Headquarters were at the American Museum of Natural History and all of the business sessions were held there.

Due to the request of the Office of Defense Transportation, a regular meeting, involving presentation of papers, annual dinner, social gatherings, and field trips was not held. However, the by-laws of the A. O. U., and the regulations governing incorporated societies are such that it was found necessary to hold a 'streamlined,' one-day business session. This was similar to the Monday sessions of past meetings and, of course, was open only to members of the Council, Fellows, and Members. The program sessions, open to Associates and the general public, usually arranged for Tuesday, Wednesday, and Thursday, were eliminated.

BUSINESS SESSIONS

The meeting on Wednesday, October 20, included two sessions of the Council, a meeting of the Fellows at 3:00 P. M., and a meeting of the Fellows and Members at 4:00 P. M. Fifteen members of the Council, 19 Fellows, and 29 Fellows and Members were present at these three meetings. Ten members of the Council met again Thursday morning to complete business on the agenda.

There were elected 2 Fellows, 5 Members, and 145 Associates. On December 1, 1943, vacancies in the various membership classes were as follows: Fellows, none; Honorary Fellows, 7; Corresponding Fellows, 24; Members, 18.

The audited Treasurer's report, after review by a committee (Ludlow Griscom, Rodolphe M. de Schauensee and William Vogt) was approved. This report indicated that the treasury was in good condition—in fact, with a nice increase over the previous year, not considering the expense of issuing during the past year the new 'Ten Year Index to The Auk.'

The Secretary's report indicated that on the day of the meeting the paid-up members of the Union were as follows: Associates, 1309; Members, 127; Fellows, 48; Patrons, 3; Emeritus Fellows, 2; Honorary Fellows, 18; Associate-elects, 77—total, including 76 Corresponding Fellows, 1660. In addition there were 194 subscribers to 'The Auk.' This gives 'The Auk' a slightly larger total circulation than in 1942. Forty-five resignations had been received during the year, and 145

Associates elected. Roll call was held for the 31 members deceased since the last meeting; 3 Honorary Fellows, 1 Corresponding Fellow, 1 Fellow Emeritus, 1 Fellow, 6 Members, and 19 Associates.

The retiring members of the Council (Ira N. Gabrielson, James Savage and Josselyn Van Tyne) were replaced for three-year terms by Alden H. Miller, Ludlow Griscom and H. C. Oberholser. The new officers elected were as follows: *President,* James L. Peters; *Vice-Presidents,* Hoyes Lloyd and George Willett; *Secretary,* Lawrence E. Hicks; *Treasurer,* J. Fletcher Street.

The Secretary presented the list of A. O. U. members in the military services of the United Nations which he had compiled during the past year, and it was agreed to publish it in 'The Auk.' Due to shortage of paper and space in 'The Auk' and the unprecedented frequent changes in addresses of members, it was voted not to publish a membership list in 1944. The Union voted to hold the next regular public meeting of the A. O. U. (whenever that may be possible) in New York City.

Hoyes Lloyd, Chairman, reported that the Canadian Membership Committee had received dues from 84 Canadian members and that deposits in Canada to the credit of the A. O. U. had reached $445.57.

Two new amendments to the By-laws were passed and laid on the table for final action at the 1944 meeting. These change Sections 4 and 5 of Article I to reduce the size of the class of Honorary Fellows from 25 to 20, and the class of Corresponding Fellows from 100 to 75 (with not more than four of the latter to be elected at any single annual meeting).

The Council voted to limit the 1944 edition of 'The Auk' to 300 copies in excess of current needs, to use no color plates unless contributed, and to limit the pages to 600 plus contributed pages plus not to exceed 24 extra pages for additional current-literature citations.

The 1943 award of the Brewster Medal was made to Dr. Alden H. Miller in recognition of his report on "Speciation in the Avian Genus Junco," published in 1941.

George H. Stuart, Julian K. Potter and James Savage were reëlected as trustees. The Union voted to accept the report of the Committee on Bird Protection (A. A. Allen, Chairman, Paul L. Errington, J. J. Hickey, J. A. Munro and Dayton Stoner). The full report will appear in 'The Auk.'

By special resolution of the Council, the Union expressed its appreciation of the kind hospitality of the American Museum of Natural History and of the arrangements made by the Chairman of the Local

Committee (Dr. Robert C. Murphy), and to Dr. Leonard C. Sanford for the dinner arranged for the 31 delegates at the University Club.

On the evening of October 20, the Fellows, Members, and delegates to the meeting of the Council were entertained at dinner in the University Club by Dr. Leonard C. Sanford, of New Haven, Connecticut. Dr. Sanford, whose name is familiar to ornithologists all over the world, is a trustee of the American Museum of Natural History and has been for many years an exceedingly active supporter of the institution's Department of Birds. It is to his enthusiastic interest that the Brewster-Sanford South American Expedition, the Whitney South Sea Expedition, and many other extensive field projects are due. Dr. Sanford also opened, with the late Lord Rothschild, the negotiations which led to the transfer to New York of the famous Tring collection of birds.

The dinner at the University Club, which was attended by thirty-one guests from various parts of the United States and Canada, was wholly informal. Most of those present, however, took the opportunity to make brief talks in which the warm spirit of personal and scientific coöperation among ornithologists was the main theme. Dr. Sanford likewise expressed his hope that the present great resources of the American Museum of Natural History should always be maintained at the highest possible level of usefulness for research, not only by American students but by those everywhere in the world. He also drew on his very long and close association with noted ornithologists of the past in recounting many tales of both historic and whimsical nature. Dr. Sanford's reminiscences, together with many of those of his guests, made the occasion one to be long remembered in the continuous but ever-renewed fellowship of ornithologists.

ATTENDANCE

The 1943 meeting, the sixteenth to be held in the New York City area, had an attendance of 29: 17 Fellows, 1 Honorary Fellow, and 11 Members.

Members were present from 11 states and provinces: New York, 12; Washington, D. C., 6; Massachusetts, 2; and 1 each from Pennsylvania, Ohio, Ontario, Illinois, Michigan, Maryland, New Jersey, and Connecticut.

CONNECTICUT, 1—*Member,* Aretas A. Saunders, Fairfield.
ILLINOIS, 1—*Fellow,* Ira N. Gabrielson, Chicago.
MARYLAND, 1—*Member,* John T. Emlen, Jr., Baltimore.
MASSACHUSETTS, 2—*Fellows,* Ludlow Griscom, James L. Peters, Cambridge.
MICHIGAN, 1—*Fellow,* J. Van Tyne, Ann Arbor.
NEW JERSEY, 1—*Member,* B. S. Bowdish, Demarest.

NEW YORK, 6—*Fellows,* Arthur A. Allen, Ithaca; C. William Beebe, James P. Chapin, Robert C. Murphy, Ernst Mayr, John T. Zimmer, New York City.
1—*Honorary Fellow,* Jean Delacour, New York City. 5—*Members,* Verdi Burtch, Branchport; Lee Crandall, Mrs. Walter W. Naumburg, John T. Nichols, New York City; James Savage, Buffalo.

OHIO, 1—*Fellow,* Lawrence E. Hicks, Columbus.

ONTARIO, 1—*Fellow,* Hoyes Lloyd, Ottawa.

PENNSYLVANIA, 1—*Fellow,* Rodolphe M. de Schauensee, Devon. 1—*Member,* J. Fletcher Street, Philadelphia.

WASHINGTON, D. C., 4—*Fellows,* Herbert Friedmann, Frederick C. Lincoln, Edward A. Preble, Alexander Wetmore. 2—*Members,* John W. Aldrich, William Vogt.

WEST VIRGINIA, 1—Representative of the Wilson Club on the A. O. U. Council—Maurice Brooks, Morgantown.

ELECTION OF OFFICERS

The election of officers for 1944 resulted as follows: *President,* James L. Peters; *Vice-Presidents,* Hoyes Lloyd and George Willett; *Secretary,* Lawrence E. Hicks; *Treasurer,* J. Fletcher Street. *Members of the Council* (in addition to officers and ex-presidents) for three years, Alden H. Miller, Ludlow Griscom and H. C. Oberholser.

The Council elected John T. Zimmer, Editor of 'The Auk'; J. Fletcher Street, Business Manager; George H. Stuart, 3rd, Julian K. Potter and James Savage, Trustees; and James L. Peters, J. Fletcher Street, Rodolphe M. de Schauensee, Lawrence E. Hicks and Ludlow Griscom, Members of the Finance Committee.

ELECTION OF FELLOWS, MEMBERS, AND ASSOCIATES

FELLOWS, 2—Dr. S. Charles Kendeigh, Champaign, Illinois; and Dr. Austin L. Rand, Ottawa, Canada.

MEMBERS, 5—Dean Amadon, New York City; Robert J. Niedrach, Denver, Colorado; Frank A. Pitelka, Berkeley, California; Julian K. Potter, Collingswood, New Jersey; Terence M. Shortt, Toronto, Ontario.

ASSOCIATES, 145—The names of the Associates who qualify will appear in the next membership list published, probably in 'The Auk' for January, 1945. It will not be possible to publish a membership list in 1944.

DECEASED MEMBERS

During the year the Union lost 32 members by death: 3 Honorary Fellows, 1 Corresponding Fellow, 1 Fellow Emeritus, 1 Fellow, 6 Members, and 26 Associates.

DR. ARTHUR HUMBLE EVANS, Honorary Fellow, 1899, 1917), aged 88, died at Berks, England, March 28, 1943.

DR. (APEL JOHAN) EINAR LONNBERG, Honorary Fellow (1918), aged 77, died at Stockholm, Sweden, December 21, 1942.

REAR ADMIRAL HUBERT LYNES, R. N., Honorary Fellow (1941), aged 68, died at a naval hospital in Wales, November 10, 1942. (Auk 60: 482–483, 1943.)

DR. JOHAN HJALMAR THEEL, Corresponding Fellow (1884), died at Stockholm, Sweden, 1943 (?).

DR. LEONHARD STEJNEGER, Fellow Emeritus (1883, 1911), aged 91, died at Washington, D. C., February 28, 1943.

DR. WILLIAM EDWIN SAUNDERS, Fellow (1883), died in his 82nd year at London, Ontario, June 28, 1943.

BAYARD HENDERSON CHRISTY, Member (1922, 1931), aged 71, died at Sewickley, Pa., June 20, 1943.

JAMES MOFFITT, Member (1926, 1937), aged 43, was killed in an airplane accident at Dutch Harbor, Alaska, on July 2, 1943, while serving with the U. S. Navy. (Auk 60: 635–636, 1943.)

ARTHUR HERBERT NORTON, Member (1890, 1902), died in his 73rd year at Portland, Maine, on January 5, 1943. (Auk 60: 315–316, 1943.)

DR. THOMAS GILBERT PEARSON, Member (1891, 1902), died in his 70th year at New York, N. Y., September 3, 1943.

MISS ALTHEA ROSINA SHERMAN, Member (1907, 1912), died in her 90th year at National, Iowa, April 16, 1943.

NORMAN ASA WOOD, Member (1904, 1912), aged 86, died at Ann Arbor, Michigan, September 7, 1943.

MISS HARRIET ABBOTT, Associate (1918), at Fryeburg, Maine, July, 1943.

CHARLES KETCHAM AVERILL, former Associate (1884), died in his 85th year at Bridgeport, Conn., February 18, 1942. (Auk 60: 135, 1943.)

MAJOR A. BURT GRESHAM, Associate (1939), British Columbia, was fatally wounded in the defense of Hongkong, December, 1941.

WILLIAM WRIGHT GRANT, Associate (1910), died in his 78th year at Geneva, N. Y., October, 1942.

PHILIP LAURENT, Associate (1902), died at Philadelphia, Pa., in 1943.

LT. ROBERT C. MCCLANAHAN, Associate (1941), aged 30, died at Camp Butner, N. C., May 6, 1943, in the service of the U. S. Army.

F. J. MALLEY, Associate (1942), died at Cleveland, O., in 1942.

WILLIAM BUTTS MERSHON, Life Associate (1905), aged 87, died at Saginaw, Mich., July 12, 1943.

PHILIP NELSON MOULTHROP, Associate (1940), aged 31, died at Cleveland, Ohio, Aug. 21, 1943.

MISS MARY O'BRIEN, Associate (1936), aged 53, died in New York City, March 25, 1943. (Auk 60: 636–637, 1943.)

S[TUYVESANT] MORRIS PELL, Associate (1932), died at Huron Mountain, Marquette Co., Michigan, August 30, 1943.

LAWRENCE [BEDFORD] POTTER, Associate (1919), died at Eastend, Sask., Canada, in November, 1943.

GEORGE HERBERT ROSS, Associate (1904), aged 74, died at Rutland, Vermont, May 31, 1942. (Auk 60: 637, 1943.)

WILLIAM JAMES RUSLING, Associate, 1941), aged 30, was killed in an auto accident near New Brunswick, N. J., August 16, 1942. (Auk 60: 486, 1943.)

HENRY MANNING SAGE, Honorary Life Associate (1885), died at Albany, N. Y., in 1933.

OSCAR PERRY SILLIMAN, Life Associate (1915), died in his 67th year at Salinas, Calif., May 9, 1943.

COL. WILLIAM MELVILLE SMALL, Associate (1924), died at San Francisco, Calif., December 5, 1942.

FRANCIS EDWARD SMITH, JR., Associate (1939), died at Winchester, Mass., June 26, 1942.

HOWARD MARSHALL WIGHT, Associate (1934), aged 53, died at Ann Arbor, Michigan, July, 1942.

HENRY MATTHEWS ZEISS, Associate (1941), died at Chicago, Illinois, in 1943.

FINANCIAL REPORT OF THE TREASURER FOR THE YEAR ENDED SEPTEMBER 30, 1943

RECEIPTS

	For Year Ended Sept. 30, 1943		*For Year Ended Sept. 30, 1942*	
Membership dues:				
Current year	$3,778.00		*$2,090.50*	
Previous years	63.00		*122.00*	
In advance	67.00		*192.00*	
		$3,908.00		*$2,404.50*
Subscriptions to 'The Auk':				
Associates-elect	171.00		*237.00*	
By Educational Fund (exchange)	63.00		.....	
Institutions	661.75		*633.89*	
Other individuals	28.40		*21.43*	
		924.15		*892.32*
Sales of publications:				
Back numbers of 'The Auk'	253.55		*600.60*	
1931–1940 Index	132.35		*463.50*	
Previous indices	18.65		*66.00*	
Check-lists	32.53		*74.00*	
Authors' reprints	311.91		*238.07*	
'50 Years of Progress'	3.00		.....	
Miscellaneous	50.00		*22.50*	
		801.99		*1,464.67*
Contributions to:				
Publication of 'The Auk'	600.00		*347.65*	
General expense	23.23		*15.56*	
Endowment Fund	25.00		*706.50*	
Purchase of War Bonds—Cash	67.00		*676.50*	
Stamps	18.75		.....	
Endowment Committee's expenses	.....		*185.00*	
		733.98		*1,931.21*
Life Membership fees	150.00		*450.00*	
		150.00		*450.00*
Income from investments:				
General Endowment Fund	823.38		*621.77*	
William Brewster Fund	403.28		*317.37*	
Ruthven Deane Fund	265.10		*203.83*	
Educational Fund	36.54		*22.75*	
Bird Protection Fund	51.09		*44.48*	
		1,579.39		*1,210.20*
Advertising income (net)	.....		*115.75*	
				115.75

RECEIPTS—*Continued*

	For Year Ended Sept. 30, 1943		*For Year Ended Sept. 30, 1942*	
Transfer of Funds:				
Petty cash fund from Chicago	$ 25.00			
From Northern Trust Co.				
Checking account	415.69			
Savings account	449.46			
		$ 890.15		
Total receipts for fiscal year		$8,987.66		*$8,468.65*

DISBURSEMENTS

Publishing and handling of 'The Auk,'				
Manufacture and distribution:				
October, 1st quarter	$1,302.16		*$1,758.53*	
January, 2d quarter	1,435.91		*1,469.69*	
April, 3d quarter	1,121.65		*1,167.49*	
July, 4th quarter	.....		*1,083.81*	
		$3,859.72		*$5,479.52*
Editor's honorarium	600.00		*600.00*	
		600.00		*600.00*
Reserve stock of publications				
Services, postage, supplies	48.66		*53.29*	
		48.66		*53.29*
Purchase of back numbers of 'The Auk'	24.25		*72.00*	
		24.25		*72.00*
Total disbursements in connection with publishing and handling of 'The Auk'		4,532.63		*6,204.81*
Publication of 1931–1940 Auk Index	2,025.58		.....	
		2,025.58		
Expenses of President	7.21		.....	
		7.21		
Expenses of Treasurer and Bus. Mgr.:				
Secretarial service	504.13		*803.75*	
Office expenses and supplies	118.32		*149.86*	
Postage and express	101.02		*179.89*	
Telephone and telegraph	.66		*40.55*	
Bank charges and foreign exchange	5.77		*46.68*	
Miscellaneous	121.11		*43.65*	
		851.01		*1,264.38*
Expenses of Secretary:				
Secretarial service	72.30		*135.93*	
Postage, mailing and telephone	44.95		*16.27*	
Printing	36.92		*4.20*	
Office supplies	.....		*2.70*	
Miscellaneous	2.50		*3.50*	
		156.67		*162.60*

DISBURSEMENTS—*Continued*

	For Year Ended Sept. 30, 1943		*For Year Ended Sept. 30, 1942*	
Additions to principal of General Endowment Fund:				
Contributions, unrestricted	.....		$ *706.50*	
Contributions, War Bonds	$ 18.75		*581.00*	
Life Membership fees	.....		*450.00*	
		$ 18.75		*1,737.50*
Disbursements from income of restricted funds:				
Printing, Endowment Committee	.....		*183.49*	
Educational Fund—By exchange	63.00		.....	
Bird Protection Fund	3.13		.....	
Brewster Memorial Award:				
Honorarium	386.23		*287.10*	
Cost of Medal	.....		*30.27*	
Cost of Medal (prepaid)	.....		*30.00*	
Engraving	2.05		.....	
		454.41		*530.86*
Contributions:				
Zoological Society of London	.....		$ *25.00*	
Local Committee's Expenses	$ 104.62		.....	
		$ 104.62		$ *25.00*
Total disbursements for the fiscal year		$8,150.88		*$9,925.15*

BALANCE SHEET

Statement of Assets and Liabilities
(as of September 30, 1943)

ASSETS:			
Total Receipts		$8,987.66	
Total Disbursements		8,150.88	
Balance on deposit with Girard Trust Co. of Philadelphia as of Oct. 1, 1943			$ 836.78
Balance on deposit with Bank of Montreal, Can., as of Oct. 1, 1943			449.98
Accounts receivable		398.50	
Less 10% reserve		39.85	
			358.65
Inventory at cost:			
1931–1940 Auk Index		2,025.58	
Subscriptions paid:			
Previous period	463.50		
This period	132.35		
		595.85	1,429.73
Other publications			25.00
TOTAL ASSETS			$3,100.14

BALANCE SHEET—*Continued*

LIABILITIES:			
Accounts payable:			
July 1943 issue of 'The Auk'		$1,267.24	
Additions to principal:			
General Endowment Fund	$ 25.00		
Defense Bond purchase, 1942	95.50		
Defense Bond purchase, 1943	67.00		
Defense Stamps	18.75		
		206.25	
Life Membership fees		150.00	
Dues collected in advance		67.00	
Restricted funds		470.96	
TOTAL LIABILITIES			$2,161.45

RECONCILIATION

Total assets and Inventory at Cost	$3,100.14
Total liabilities	2,161.45
Cash and Inventory on hand	$ 938.69

The above report, audited by William A. Dever, public accountant, was accepted by the Council on behalf of the Union at the annual business meeting held in New York on October 20, 1943.

Nothwithstanding the fact that several hundred from the membership are serving in various capacities in the armed forces there has been no marked diminution in the enrollment of members. Nevertheless, it is imperative that the membership be increased to take care of the growing obligations of the Union through publications and other channels. The Treasurer would welcome the submission, by members, of names of others who might be interested in taking out membership.

The 1931–40 Index to 'The Auk' came off the press in the early summer at a cost which has placed quite a drain upon the fluid resources of the Union. Each member of the Union should own a copy, not only as a valuable reference volume but in support of the activities of the Union as well.

In response to the appeal of the past Treasurer that members contribute towards the purchase of War Bonds to be added to the General Endowment Fund, additional gifts have been received during the past year. In addition to those who have already contributed, the following names should be added:

Francis H. Allen
M. Hortense Beards
Mary A. Bennett
Marion A. Boggs
Fannie Cantor
Mrs. G. E. Charles
James R. Clark
Mrs. Howard A. Drew
William Drury, Jr.
John W. Eaton
Mrs. Mena V. French
J. Halford Gordon
Byron E. Harrell
A. Sidney Hyde
C. Haven Kolb, Jr.
Leon N. Leavitt
W. E. Maynard
O. J. Murie
Eugene P. Odum
Dr. William Pepper
James L. Peters
W. D. Quattlebaum
Mrs. Bruce Reid
Dr. J. Van Tyne
Charles T. Voorhies

The annual report of the Investing Trustees upon the condition of the Endowment Fund as of September 30, 1943, was presented to and accepted by the Council at the business meeting on October 20, 1943. This report revealed that the capital assets of the Union, as invested during the past year, have yielded a profit of about 4%. The market value of the invested funds of the Union as of September 30, 1943, stands at $35,753.27.

J. FLETCHER STREET, *Treasurer and Business Manager*

A PRELIMINARY LIST OF THE MEMBERS OF THE AMERICAN ORNITHOLOGISTS' UNION ENGAGED IN THE WAR SERVICES OF THE UNITED NATIONS

(COMPILED BY LAWRENCE E. HICKS, SECRETARY, A.O.U.)

NOTE: No attempt has been made to list the ever-changing military addresses or, in most cases, the branch of service. Ranks given are those last reported but many of these probably have already been raised. Members have been assigned to states and provinces as per the A.O.U. distributional list of members published in 'The Auk' October, 1941. The 189 men listed represent 46 states and provinces. Members are urged to submit additions or corrections to this list to the Secretary so that a supplement may be prepared.

UNITED STATES

ARIZONA

Corp. Allan R. Phillips

CALIFORNIA

2nd Lt. John Davis
Keith L. Dixon
Lt. Jack Guggolz
Pvt. Joe T. Marshall
Pvt. Robert Medcalf
*Lt. James Moffitt
Pvt. Harry C. Parker
Lt. Roland C. Ross, A. C.
Jack W. Sherwood (U. S. N.)
Charles G. Sibley
L. Philbrick Smith (U. S. N.)
Lt. Kenneth E. Stager

CONNECTICUT

2nd Lt. Joseph Brauner

DELAWARE

1st Lt. Alfred Gross, M. C.

DISTRICT OF COLUMBIA

**Lt. Robert McClanahan (Camp Butner, N. Car.)
Lt. (j.g) Louis J. Halle, Jr.
Ens. George A. Petrides (U. S. N. R.)

FLORIDA

Lt. (j.g.) J. C. Dickinson (U. S. C. G. R.)
Lt. (j. g.) Willard E. Dilley
C. C. M. Guy Van Duyn

GEORGIA

Capt. F. S. Barkalow, Jr.

IDAHO

William H. Langley (U. S. N.)

ILLINOIS

Rudyerd Boulton (specialized services)
Cpl. Eugene S. Castle
Ensign E. J. Koestner
PhM. 3/c Robert B. Lea

INDIANA

Capt. Harold A. Zimmerman

IOWA

Pvt. Robert A. Pierce
Capt. Thomas G. Scott

KANSAS

Lt. L. W. Compton
Lt. Theodore Downs
Pvt. Donald P. Duncan
Lt. Col. Wm. C. Menninger

KENTUCKY

Pvt. Robert M. Mengel (Army Air Corps)
Capt. Burt L. Monroe (Air Corps)

MARYLAND

Robert W. Allen (U. S. A.)
Lt. Comdr. William H. Berry
Pvt. David V. Black
Pfc. Gorman Bond

*Killed in the Aleutians, July 2, 1943
**Deceased May 6, 1943

Lt. Murray L. Johnson, M. C., U. S. N. R.
Pvt. M. Brooke Meanley

MASSACHUSETTS

2nd Lt. Donald C. Alexander (Air Corps)
Lt. O. L. Austin, Jr. (U. S. N.)
T/Sgt. Edwin A. Benchley, Jr.
Sgt. Roland C, Clement
Lt. Edwin G. Davis
C. M. 2nd Cl. John W. Eaton
Lt. Comdr. Theodore L. Eliot (U. S. N. R.)
David L. Garrison
Lt. James C. Greenway, Jr. (U. S. N.)
Capt. Joseph A. Hagar
Sgt. Arthur T. Hale, Jr.
Pfc. N. P. Hill
Lt. Charles P. Lyman
Capt. Henry M. Parker
Cadet James Peabody
Lt. (j. g.) Oliver K. Scott

MICHIGAN

Lt. G. A. Ammann
Sgt. Thomas D. Hinshaw
Lt. F. N. Hamerstrom, Jr.

MINNESOTA

Lt. Carl R. Eklund
Byron E. Harrell (A. S. T. U.)
Lt. (j. g.) Oscar Owre Jr.
Lt. George N. Rysgaard
Ens. James D. Smith (U. S. N.)

MISSISSPPI

Pvt. Walton B. Savin

MISSOURI

Lt. I. C. Adams (Ft. Sam Houston, Tex.)
Lt. Wm. A. Brokaw (Camp Pendleton, Calif.)
A/C William A. Jenner
Lt. Kenneth K. Krumm
Major Howard J. Lee (M. P.)

NEW HAMPSHIRE

Lt. Leon N. Leavitt
Pvt. Gerald E. Sedgewick

NEW JERSEY

Lt. Edward L. Chalif
Sgt. L. R. Corn
Lt. Alfred E. Eynon
Lt. M. S. Ferguson (Army Med. School, Washington, D. C.)
Cpl. Frederick W. Loetscher, Jr.
Lt. Col. Russel L. Meredith
Ensign Fred M. Packard
Philip C. Walton

NEW MEXICO

Cand. Lawrence V. Compton

NEW YORK

Lt. (j. g.) Richard Adelson
W. O. Robert P. Allen
Lt. Richard Allyn (Med. Corps)
Pvt. Dean Amadon
Pvt. Hugh Birckhead
ASV-7 Charles Brand (U. S. N. R.)
A/C Stephen W. Eaton
Lt. Carl R. Eklund
Cadet Stanton G. Ernst
Capt. William J. Hamilton
T/5 Oscar Hawksley
Cpl. Southgate Hoyt
Ens. Everett W. Jameson (U. S. N. R.)
Pfc. Arthur M. Joost
Paul P. Kellogg (Navy Field Engineer)
Ensign Ward Klepfer, U. S. N. R.
A/C Allan S. Klonick
Ensign Ralph S. Palmer (U. S. N. R.)
Major Clifford H. Pangburn
Capt. George M. Sutton
Lt. James T. Tanner
H. B. Tordoff
Lt. Roland Walker
Lt. B. B. Warfield

NORTH CAROLINA

Sgt. Edward T. Cone

NORTH DAKOTA

Sp. (P) 2/c Cordia J. Henry

OHIO

Capt. Jack McD. Allen (U. S. Marines)
Sgt. John Anderson (overseas)
Cpl. William C. Baker
Hubert Bezdek
Lt. Halden H. Binegar

Sgt. David D. Blyth
Sgt. Floyd B. Chapman
Eugene H. Dustman
Sgt. Frank D. Haller
Dale Jenkins
Sgt. James Jenkins
David T. Katz (U. S. Med. Corps)
Pvt. Charles H. Knight
S 2/c Robert J. Lebrecht
Lt. Daniel L. Leedy (overseas)
Pfc. Ernie Limes
Lt. Karl Maslowski
Sgt. Enos O. Mellinger
Lt. Robert H. Mills (Army Air Corps)
Pvt. Paul J. Moore
Lt. David C. Nutt
Sgt. Roy H. Riethmiller
Lt. John S. Rose (Army Air Corps)
Nelson Thompson (U. S. N. R.)
Pvt. Charles Walker (Discharged)

OKLAHOMA

Richard T. Darby
Jr. PhM. 2/c Joseph C. Howell
Leonard L. Uttal (Naval Hospital)

OREGON

2nd Lt. A. Sidney Hyde (U. S. Army Air Corps)

PENNSYLVANIA

Cand. J. M. Abbott
Lt. (j. g.) L. J. Bennett (U. S. N. R.)
Y 3/c Maurice Broun
J. Frank Cassel
Lt. Josephine Dudley (W. A. C.)
Lt. (j. g.) Richard Gerstell
George E. Grube, A. S. (U. S. N. R.)
Lt. Comd. Frank P. Mathews, (U. S. N. R.)
Lt. H. Radclyffe Roberts
Lewis MacCuen Smith
S 2/c Oliver L. Smith
Lt. (j. g.) H. Goodwin Stevenson, Jr. (U. S. N. R.)
Lt. C. Brooke Worth

RHODE ISLAND

Philip C. Walton

SOUTH CAROLINA

Cpt. H. L. Harllee
Lt. E. Milby Burton

TENNESSEE

Lt. Ben B. Coffey, Jr.
S/Sgt. Eugene F. Parrish
Lt. (j. g.) James T. Tanner

TEXAS

Capt. Charles H. Lockhart
Sgt. Joseph M. Heiser
Lt. Carl B. Kofort
Pvt. J. Dan Webster

UTAH

Harold G. Higgins
Lt. James H. Phelps (Camp Crowder, Mo.)

VIRGINIA

Maj. John W. Bailey
Pvt. Ernest P. Edwards (Army Air Corps)

WASHINGTON

Lt. George E. Hudson
Capt. William H. Munter

WEST VIRGINIA

Lt. Karl W. Haller
Pvt. William C. Legg
Lt. William A. Lunk (overseas)

WISCONSIN

Lt. (j. g.) Irven O. Buss (U. S. N. R.)
2nd Lt. Robert H. Gensch

CANADA

ALBERTA

George A. LaBelle (R. C. A. F.)
Pvt. Albert L. Wilk

MANITOBA

***Major A. Burt Gresham

NOVA SCOTIA

Fl. Sgt. Wm. H. Carrick (C. A. O. P., R. C. A. F., overseas)

ONTARIO

Lt. F. A. Banfield (C. S. R. U., C. A., overseas)

***Fatally wounded in defense of Hong Kong, December, 1941

Lt. Col. Lionel S. Dear
Capt. Wm. W. H. Gunn (R. C. O. C., Montreal)
Edwin C. MacDonald (R. C. A. F.) Rivers, Manitoba
Fl. Lt. Duncan A. MacLulick (R. C. A. F.) Rivers, Manitoba
D. S. Miller (L. C. A., R. C. A. F., overseas)
Pvt. Norman I. Rogers (Camp Border, Ont.)
A. C. 2 David I. Snell (R. C. A. F.)
Lt. Ronald W. Smith (R. C. A. F.)

QUEBEC

Major James D. Cleghorn
Lt. Thomas H. Manning (Royal Canadian Navy)

CANAL ZONE

Lt. Comdr. Frank P. Mathews

ENGLAND

P/O P. A. D. Hollum (R. A. F.)

THE AMERICAN ORNITHOLOGISTS' UNION AT A GLANCE

Organized—in New York City, Sept. 26, 1883: Incorporated—in Washington, D. C., Nov. 15, 1888.

Objects: "The advancement of its members in Ornithological Science; the publication of a journal of Ornithology and other works relating to that science; the acquisition of a library; and the care and collection of materials relating to the above objects, under the restrictions and regulations established in its By-Laws."

Officers: President, two Vice-Presidents, Secretary, Treasurer, and 9 elected Councilors. Two Councilors appointed by Cooper Club and Wilson Club. Officers, the Editor and ex-Presidents are ex-officio members of the Council.

Members: Associates (unlimited), Members (150), Corresponding Fellows (100), Honorary Fellows (25), Fellows (50), Fellows Emeriti, Patrons. (Total membership in 1944 about 1700.)

Dues: Annual—Associates $3, Members $4, Fellows $5.
Life-Members of any class $100; Patrons $1000.

Income: From annual dues, sale of publications, life memberships, and contributions.

Meetings: Annual—usually in October or November.

Publications: 'The Auk,' a quarterly journal in 61 volumes, with 5 general indexes: 1876–1900, 1901–1910, 1911–1920, 1921–1930, 1931–1940. 'Check-List of North American Birds': 1st ed., 1886; 2d ed., 1895; 3d ed., 1910; 4th ed., 1931. 'Code of Nomenclature,' 1886; Revised ed., 1908. (See Auk, '24, 142.)

Brewster Medal: The income from a fund of $7250, established in 1919 by the friends of William Brewster, awarded biennially (now annually) to the author of the most important work relating to the birds of the Western Hemisphere published during the preceding six years. Awarded in 1921 to Robert Ridgway, in 1923 to A. C. Bent, in 1925 to Todd and Carriker, in 1927 to John C. Phillips, in 1929 to C. E. Hellmayr, in 1931 to Mrs. Florence M. Bailey, in 1933 to F. M. Chapman, in 1935 to H. L. Stoddard, in 1937 to R. C. Murphy, in 1938 to Thomas S. Roberts, in 1939 to Witmer Stone (posthumously), in 1940 to James L. Peters, in 1941 jointly to Donald R. Dickey and A. J. van Rossem, in 1942 to Margaret M. Nice, in 1943 to Alden H. Miller.

WHERE TO FIND FURTHER INFORMATION

Addresses of Officers and Members—Annual list usually in April Auk. Copies of last list (1942) available at 50 cents each.

The Auk (Location of sets)—Auk, '19, 634; '20, 348; '24, 207; '29, 584.

The Auk in Public Libraries—Auk, '30, 609.

Biographies of Deceased Members—Auk, '35, lviii and current issues.

Brewster Medal—Auk, '20, 29; '22, 86; '24, 125; '25, 484; '26, 69; '28, 71; '30, 219; '32, 52; '34, 53; '36, 57; '38, 317; '39, 113; '40, 142.

By-Laws: Auk, '27, xi; Auk, '38, 330–340.

Dates of Publication of The Auk (1912–1943) follow the Index in each volume or the title pages in later volumes.

History of the Union: Allen, J. A., 'A Seven Years' Retrospect,' 1891; 'The A. O. U.,' Bird-Lore, 1899, 143.
Palmer, T. S., 'The A. O. U.,' Am. Mus. Journal, '18, 473; 'Looking Backward,' Auk, '24, 139; Fifty years' progress of American Ornithology, 1933, 7–27.

Meetings: Auk, '24, 143; '30–'36, back cover of October numbers.

Membership:—Auk, '24, 140; Fellows, '18, 110; Foreign Members, '18, 266; Members, '18, 384; Associates, '18, 513.

Permanent Funds: Auk, '20, 513. (See yearly Treasurer's and Trustees' reports.)

THE AUK

A Quarterly Journal of Ornithology

ORGAN OF THE AMERICAN ORNITHOLOGISTS' UNION

Manuscripts should be typewritten if possible. As an aid in bibliography, title should be brief, within one printed line. References to literature may be inserted in parentheses at the appropriate places in the text, or listed at the end of the paper rather than in footnotes. Roman numerals and extensive tables are to be avoided. Line drawings intended for text illustrations should be in India ink; halftones can only be printed as plates. Longer articles should have a brief summary at the end. Except on request, no proofs of 'General Notes' or short communications will be submitted to authors.

Twenty-five reprints of leading articles are furnished authors free of charge. Reprints from 'General Notes,' 'Correspondence,' etc., and those from leading articles in excess of twenty-five must be paid for by the author, and must be ordered from the editor when the manuscript is submitted. Printed covers can be furnished at additional cost.

All articles and communications intended for publication and all books and publications intended for review should be sent to the Editor,

JOHN T. ZIMMER
American Museum of Natural History
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